

# Smith

CAST IRON BOILERS

## GB300

# NATURAL OR PROPANE GAS BOILER

## INSTALLATION & OPERATING MANUAL



Designed and tested according to A.S.M.E. Boiler and Pressure Vessel Code, Section IV for a maximum allowable working pressure of 80 psi US, 50 psi Canada water, 15 psi steam.

**CAUTION:** Do not use automotive anti-freeze in the boiler waterways. If the use of antifreeze is necessary an anti-freeze specifically formulated for hydronic heating systems must be used!

Water treatment is not recommended. This boiler uses gaskets made from ethylene propylene, EPT, to seal the section ports. Consult a water treatment professional before adding any chemicals to the boiler water to ensure that they are compatible with the gaskets. Failure to comply with this caution can result in failure of the gaskets voiding the warranty.

**WARNING:** If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

### WHAT TO DO IF YOU SMELL GAS:

- Do not try to light any appliance.
- Do not touch any electrical switch. Do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

A qualified installer, service agency or the gas supplier, must perform installation and service.

INSTALLER READ THESE INSTRUCTIONS CAREFULLY.  
THEY WILL SAVE YOU VALUABLE TIME WHEN ASSEMBLING THE BOILER.

THESE INSTRUCTIONS TO BE AFFIXED ADJACENT TO THE BOILER.  
CONSUMER, RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE PURPOSES.

**Smith**  
CAST IRON BOILERS

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GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

**Assurez-vous de bien suivre les instructions données dans cette notice pour réduire au minimum le risque d'incendie ou d'explosion ou pour éviter tout dommage matériel, toute blessure ou la mort**

**Ne pas entreposer ni utiliser d'essence ou ni d'autres vapeurs ou liquides inflammables à proximité de cet appareil ou de tout autre appareil.**

**QUE FAIRE SI VOUS SENTEZ UNE ODEUR DE GAZ:**

- **Ne pas tenter d'allumer d'appareil.**
- **Ne touchez à aucun interrupteur; ne pas vous servir des téléphones se trouvant dans le bâtiment.**
- **Appelez immédiatement votre fournisseur de gaz depuis un voisin. Suivez les intructions du fournisseur.**
- **Si vous ne purvez rejoindre le fournisseur, appelez le service des incendies.**

**L'installation et l'entretien doivent être assurés par un installateur ou un service d'entretien qualifié ou par le fournisseur de gaz.**

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BEFORE YOU START

This manual covers the application, installation, operation and maintenance of a GB300(S,W) low pressure steam or hot water boiler.

To obtain the safe, dependable, efficient operation and long life for which this boiler was designed, these instructions must be read, understood and followed.

The GB300(S,W) boilers have been design certified by CSA for use with natural and propane gas under the latest revision of ANSI-Z21.13/CSA 4.9 Gas-Fired Low Pressure Steam and Hot Water Boilers and CGA 3.3, Gas-Fired Steam and Hot Water Boilers. Each unit has been constructed and hydrostatically tested for a maximum working pressure of 80 psi US, 50 psi Canada, 15 psi steam in accordance with Section IV of the A.S.M.E. Boiler and Pressure Vessel Code for cast iron boilers.

All aspects of the boiler installation must conform to the requirements of the authority having jurisdiction, or, in the absence of such requirements, to the National Fuel Gas Code, ANSI Z223.1/NFPA - latest revision. Where required by the authority having jurisdiction, the installation must conform to the Standard for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME CSD-1.

This product must be installed by a licensed plumber or gas fitter when installed within the Commonwealth of Massachusetts.

In Canada, the installation must be in accordance with the requirements of CAN/CGA B149.1 or .2, Installation Code for Gas Burning Appliances and Equipment.

The owner should maintain a record of all service work performed with the date and a description of the work done. Include the name of the service organization for future reference.

Direct all questions to your Smith Cast Iron Boiler distributor or contact the Smith Customer Service Department, 260 North Elm Street, Westfield, MA 01085. Always include the model and serial numbers from the rating plate of the boiler in question.

# GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

## BOILER RATINGS & CAPACITIES

Before undertaking the installation of the GB300(S,W) boiler check the boiler rating plate to ensure that the boiler has been sized properly for the job. The rating label has been packed with the controls. The “Net I=B=R Ratings” specify the equivalent amount of direct cast iron radiation that the boiler can supply under normal conditions. Also ensure that the boiler has been set up for the type of gas available at the installation site. Other important considerations are the availability of an adequate electrical supply, fresh air for combustion and a suitable chimney or vent system.

## BOILER LOCATION

1. Locate the boiler in an area that provides good access to the unit. Servicing may require the removal of jacket panels. Allow a minimum clearance of **2 ft, 0.61 m** between adjacent construction and the boiler sides and draft hood. A minimum clearance of **4 ft, 1.22 m** must be maintained between the front of the boiler and adjacent construction. Accessibility clearances **should** take precedence over fire protection clearances, or use which ever is greater.

2. An optimum site will be level, central to the piping system, close to a chimney and have adequate fresh air for combustion.

3. Ensure that the floor is structurally sound and will support the weight of the boiler. Never install a GB300(S,W) on a concrete floor that contains wires, cables, water pipes or hoses. This boiler is designed for non combustible floors only! Never install this boiler on combustible materials or carpeting even if a non-combustible foundation material is placed over them!

**WARNING: Never install a GB300(S,W) boiler on top of combustible flooring! Failure to comply with this warning may result in a fire causing extensive property damage, severe personal injury or death!**

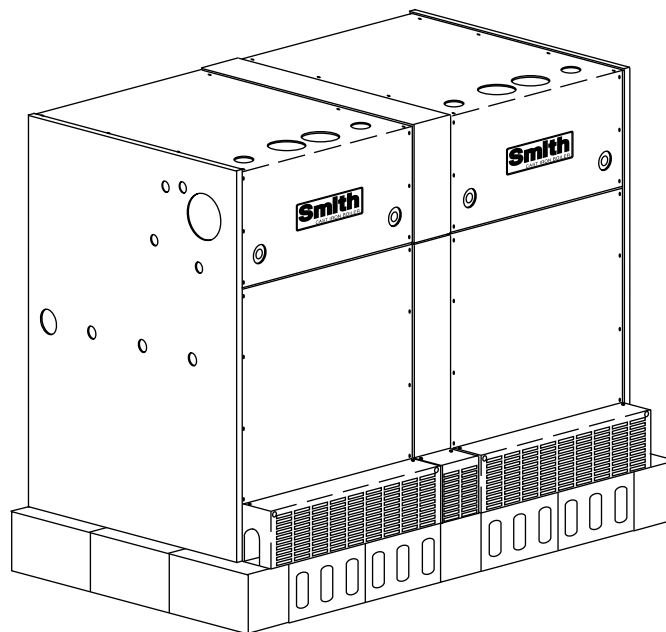
4. DO NOT install this boiler in a location that would subject any of the gas ignition components to direct contact with water or excessive moisture during operation or servicing. A full concrete foundation is recommended to protect the boiler from moisture and debris, Figure 1.

**NOTE: The boiler must be assembled on a level, non-combustible surface. If the floor is not level a pad must be poured to provide a level surface. If a concrete block base is used level it using non-combustible shims or grout.**

5. DO NOT place this boiler in a location that would restrict the introduction of combustion air into the boiler.

**WARNING: Never store combustible materials, gasoline or any product containing flammable vapors or liquids in the vicinity of the boiler. Failure to comply with this warning can result in an explosion or fire causing extensive property damage, severe personal injury or death!**

**Figure 1 Concrete Block Base Construction**



GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

COMBUSTION AIR & VENTILATION

**WARNING:** This boiler must be supplied with combustion air in accordance with Section 5.3, Air for Combustion & Ventilation, of the latest revision of the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and all applicable local building codes. Canadian installations must comply with CAN/CGA B149.1 or .2 Installation Code. Failure to provide adequate combustion air for this boiler can result in excessive levels of carbon monoxide which can result in severe personal injury or death!

**WARNING:** Never operate a GB300 in an environment subjected to a negative pressure unless it is Direct Vented. Failure to comply with this warning can result in excessive levels of carbon monoxide causing severe personal injury or death!

To operate properly and safely this boiler requires a continuous supply of air for combustion. Oxygen is used by the boiler burners to burn the gas. **NEVER** store objects on or around the boiler. In addition, air is also used to assist in the safe disposal of the products of combustion. This air is known as dilution air and mixes with the products of combustion to assist in their exit through the flue pipe and chimney. An adequate supply of air must be available to replace the air used by these processes.

Older buildings often have enough natural infiltration to provide an adequate amount of combustion air provided that the demand for combustion air is not too great.

Buildings that are relatively new or “tight” will most likely require the installation of a fresh air duct or other means of providing make-up air. Any building utilizing other gas burning appliances, a fireplace, wood stove or any type of exhaust fan must be checked for adequate combustion air when all of these devices are in operation at one time. Sizing of an outside air duct must be done to meet the requirements of all such devices.

*All Air From Inside The Building*

If the boiler is to be located in a confined space minimum clearances of **2 ft, 0.61 m** must be maintained between the boiler and any adjacent construction. When installed in a confined space two permanent openings communicating with an additional room(s) are required. The combined volume of these spaces must have sufficient volume to meet the criteria for an unconfined space. The total air requirements of all gas utilization equipment, fireplaces, wood stoves or any type of exhaust fan must be considered when making this determination.

Each opening must have a minimum free area of **1 in²/1000 Btu/hr, 2200 mm²/kW** based on the total input rating of ALL gas utilization equipment in the confined area. Each opening must be no less than **100 in², 64,516 mm²** in size. The upper opening must be within **12 in, 300 mm** of, but not less than **3 in, 80 mm** from, the top of the enclosure. The bottom opening must be within **12 in, 300 mm** of, but not less than **3 in, 80 mm** from, the bottom of the enclosure.

*All Air From Outside The Building*

When installed in a confined space two permanent openings communicating directly with, or by ducts to, the outdoors or spaces that freely communicate with the outdoors must be present. The upper opening must be within **12 in, 300 mm** of, but not less than **3 in, 80 mm** from, the top of the enclosure. The bottom opening must be within **12 in, 300 mm** of, but not less than **3 in, 80 mm** from, the bottom of the enclosure.

Where directly communicating with the outdoors or communicating with the outdoors through vertical ducts, each opening shall have a minimum free area of **1 in²/4000 Btu/hr, 550 mm²/kW** of the total input rating of all of the equipment in the enclosure.

Where communicating with the outdoors through horizontal ducts, each opening shall have a minimum free area of **1 in²/2000 Btu/hr, 1100 mm²/kW** of the total input rating of all of the equipment in the enclosure.

When ducts are used, they must have the same cross-sectional area as the free area of the opening to which they connect.

When calculating the free area necessary to meet the make-up air requirements of the enclosure, consideration must be given to the blockage effects of louvers, grills and screens. Screens must have a minimum mesh size of **1/4 in, 6.4 mm**. If the free area through a louver or grill is not known ducts should be sized per Table 1 below.

Table 1 Make-up Air Duct Sizing

Input (MBH)	Required Cross Sectional Duct Area					
	1/4 in, 6.4 mm		Metal		Wooden	
	Wire Screen		Louvers		Louvers	
	in²	cm²	in²	cm²	in²	cm²
400	100	645	133	858	400	2581
600	150	968	200	1290	600	3871
800	200	1290	267	1723	800	5161
1000	250	1613	333	2148	1000	6452
1200	300	1935	400	2581	1200	7742
1400	350	2258	467	3013	1400	9032
1600	400	2581	533	3439	1600	10,323
1800	450	2903	600	3871	1800	11,613
2000	500	3226	667	4303	2000	12,904

# GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

## CHIMNEY & VENT PIPE CONNECTIONS

**WARNING:** The vent installation must be in accordance with Part 7, Venting of Equipment, of the National Fuel Gas Code, ANSI Z223.1/NFPA54-latest revision or applicable provisions of the local building codes. Canadian installations must comply with CAN /CGA B149.1 or .2 Installation Code. Improper venting of this boiler can result in excessive levels of carbon monoxide, which can result in severe personal injury or death!

### Chimney Inspection & Sizing

If this boiler will be connected to a masonry chimney, a thorough inspection of the chimney must be performed. Ensure that the chimney is clean, properly constructed and properly sized. Table 2 lists the equivalent breeching and flue sizes required for the GB300 boilers.

**Table 2 Vent Outlet, Equivalent Breeching & Chimney Size**

Boiler Model	Vent Outlets # of outlets/dia. in inches	Equivalent Breeching & Chimney size	
		Diameter	
		inches	mm
GB300-5	1 @ 10	10	254
GB300-6	1 @ 12	12	305
GB300-7	1 @ 12	12	305
GB300-8	2 @ 10	14	356
GB300-9	2 @ 10	14	356
GB300-10	2 @ 10	14	356
GB300-11	2 @ 12	15	381
GB300-12	2 @ 12	15	381
GB300-13	2 @ 12	15	381
GB300-14	1 @ 12, 2 @ 10	16	406
GB300-15	4 @ 10	17	432
GB300-16	4 @ 10	17	432
GB300-17	4 @ 10	17	432
GB300-18	4 @ 10	17	432
GB300-19	4 @ 10	17	432

**NOTE:** These sizes are based on a 20 foot chimney height.

When more than one appliance is connected to the same chimney flue the flue must be large enough to safely vent the combined output of all the appliances.

**WARNING:** If an appliance using any type of a mechanical draft system operating under positive pressure is connected to a chimney flue, never connect any other appliances to this flue. Doing so can result in the accumulation of carbon monoxide which can cause severe personal injury or death!

## VENT CONNECTIONS

Always use a type B or single wall galvanized metal vent pipe the same diameter as the draft hood flue collar. Use the shortest, straightest vent system possible for the installation. If horizontal runs exceed 6 feet they must be supported at maximum 6 foot intervals with overhead hangers. The vent system should be sloped up towards the chimney at a minimum rate of 1/4 inch/foot and terminate flush with the inside of the chimney flue. Fasten each connection with at least 3 corrosion resistant sheet metal screws.

**WARNING:** Never modify or alter any part of the boiler's draft hood. This includes the removal or alteration of any baffles. Never install a vent pipe of a diameter different than that of the boiler draft hood flue collar. Failure to comply with this warning can result in severe personal injury or death.

Always provide a minimum clearance of 6 inches between type C vent pipe and any combustible materials. Type B1 vent may be used, clearance between it and any combustible material must be as listed.

**WARNING:** Failure to maintain minimum clearances between vent connectors and any combustible material can result in a fire causing extensive property damage, severe personal injury or death!



## GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

### COMMON VENT SYSTEMS

If an existing boiler is removed from a common venting system, the common venting system may then be too large for the proper venting of the remaining appliances connected to it. At the time of removal of an existing boiler, the following steps shall be followed with each appliance remaining connected to the common venting system placed in operation, while the other appliances remaining connected to the common venting system are not in operation.

Au moment du retrait d'une chaudière existante, les mesures suivantes doivent être prises pour chaque appareil toujours raccordé au système d'évacuation commun et qui fonctionne alors que d'autres appareils toujours raccordés au système d'évacuation ne fonctionnent pas: système d'évacuation.

- a. Seal any unused openings in the common venting system.

Sceller toutes les ouvertures non utilisées du système d'évacuation.

- b. Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.

Inspecter de façon visuelle le système d'évacuation pour déterminer la grosseur et l'inclinaison horizontale qui conviennent et s'assurer que le système est exempt d'obstruction, d'étranglement de fuite, de corrosion et autres défaillances qui pourraient présenter des risques.

- c. Where it is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any appliance not connected to the common venting system.

Turn on any exhaust fans, such as range hoods and bathroom exhaust, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.

Dans la mesure du possible, fermer toutes les portes et les fenêtres du bâtiment et toutes les portes entre l'espace où les appareils toujours raccordés du système d'évacuation sont installés et les autres espaces du bâtiment. Mettre en marche les sècheuses, tous les appareils non raccordés au système d'évacuation commun et tous les ventilateurs d'extraction comme les hottes de cuisinière et les ventilateurs des salles de bain. S'assurer que ces ventilateurs fonctionnent à la vitesse maximale. Ne pas faire fonctionner les ventilateurs d'été. Fermer les registres des cheminées.

- d. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.

Mettre l'appareil inspecté en marche. Suivre les instructions d'allumage. Régler le thermostat de façon que l'appareil fonctionne de façon continue.

## GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

- e. Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from a cigarette, cigar or pipe.

Faire fonctionner le brûleur principal pendant 5 min ensuite, déterminer si le coupe-tirage déborde à l'ouverture de décharge. Utiliser la flamme d'une allumette ou d'une chandelle ou la fumée d'une cigarette, d'un cigare ou d'une pipe.

- f. After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous condition of use.

Une fois qu'il a été déterminé, selon la méthode indiquée ci-dessus, que chaque appareil raccordé au système d'évacuation est mis à l'air libre de façon adéquate. Remettre les portes et les fenêtres, les ventilateurs, les registres de cheminées et les appareils au gaz à leur position originale.

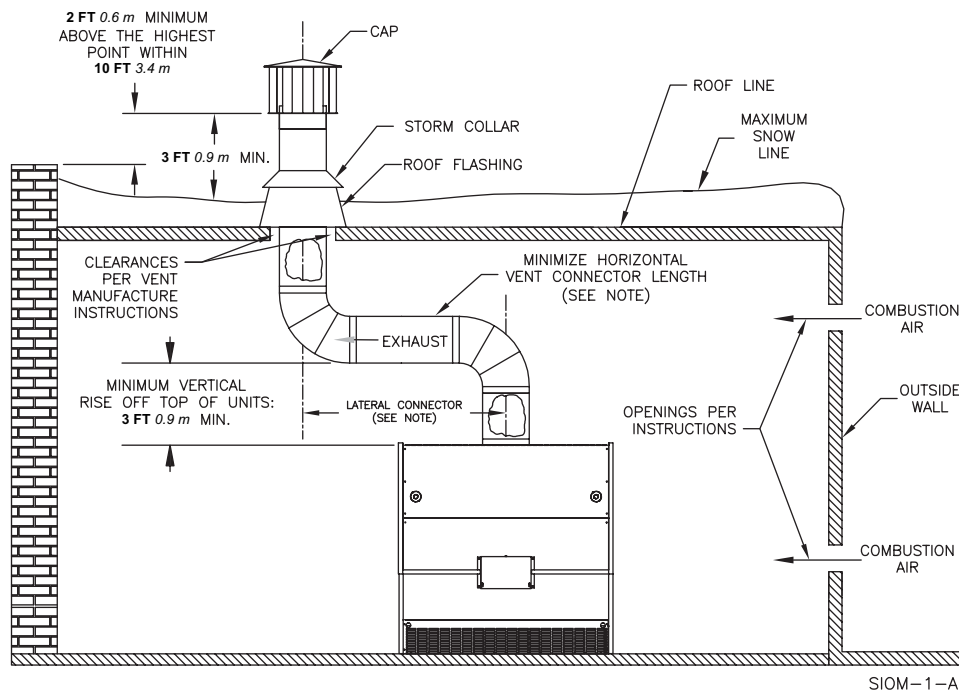
- g. Any improper operation of the common venting system should be corrected so the installation conforms with the National Fuel Gas Code, ANSI Z223.1/NFPA 54. When resizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in Part 11 in the National Fuel Gas Code, ANSI Z223.1/NFPA 54.

Tout mauvais fonctionnement du système d'évacuation commun devrait être corrigé de façon que l'installation soit conforme au National Fuel Gas Code, ANSI

Z223.1/NFPA 54 et (ou) aux codes d'installation CSA-B149. Si la grosseur d'une section du système d'évacuation doit être modifiée, le système devrait être modifié pour respecter les valeurs minimales des tableaux pertinents de l'appendice F du National Fuel Gas Code, ANSI Z223.1/NFPA 54 et (ou) des codes d'installation CSA-B149.

Figure 2A

Vertical Venting Using A Metal Chimney System And Inside Air(GB300 Series)



NOTE:

VENT CONNECTOR MATERIAL AND DESIGN MUST BE CALCULATED USING THE INDIVIDUAL VENTING TABLES IN THE NATIONAL FUEL GAS CODE ANSI Z223.1, LATEST EDITION.

# GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

Figure 2B

Dual Flue Outlets And Inside Air (GB300 Series)

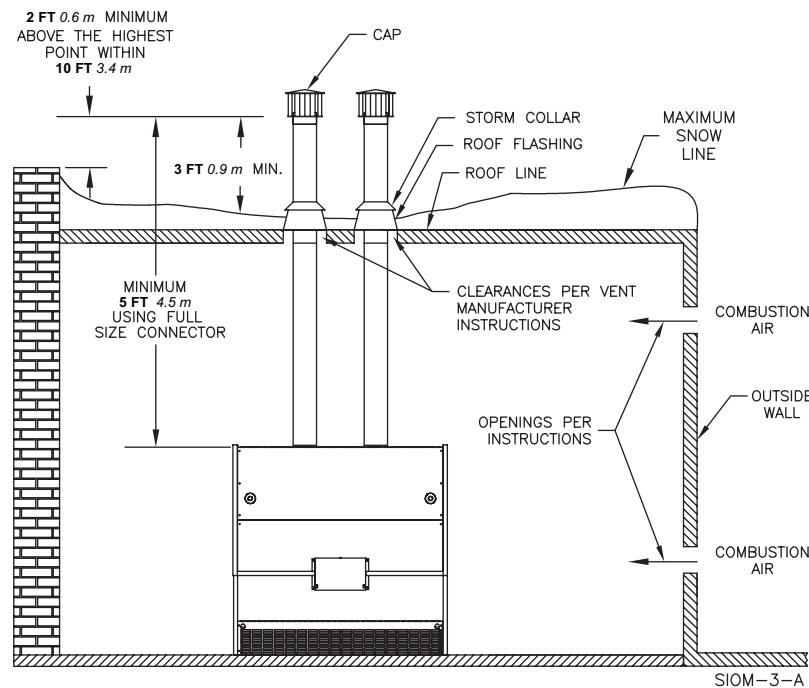
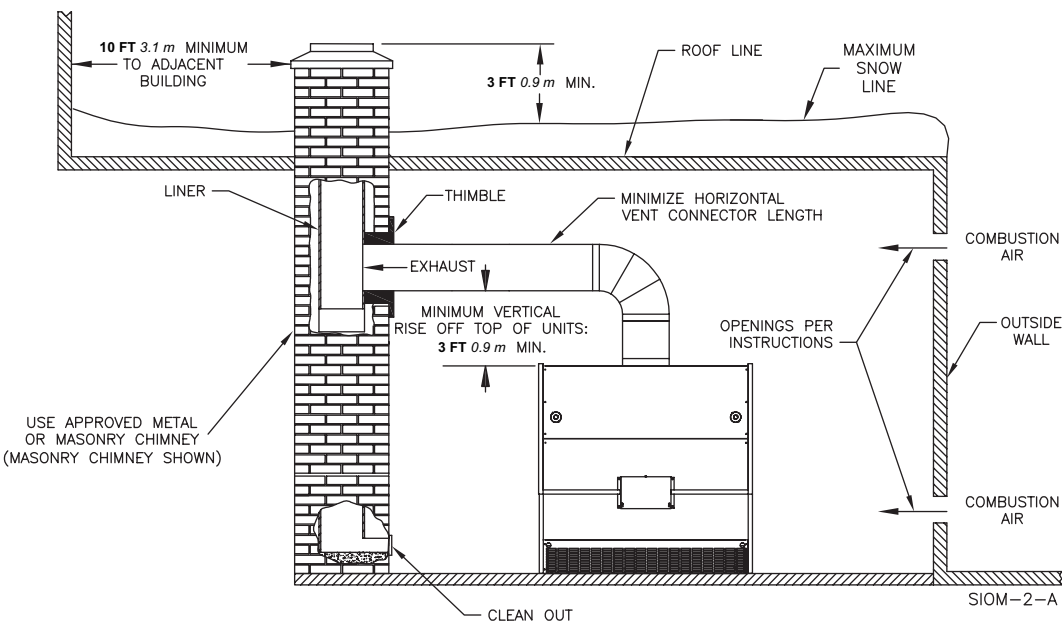


Figure 2C

Vertical Venting Using A Masonry Chimney And Inside Air (GB300 Series)

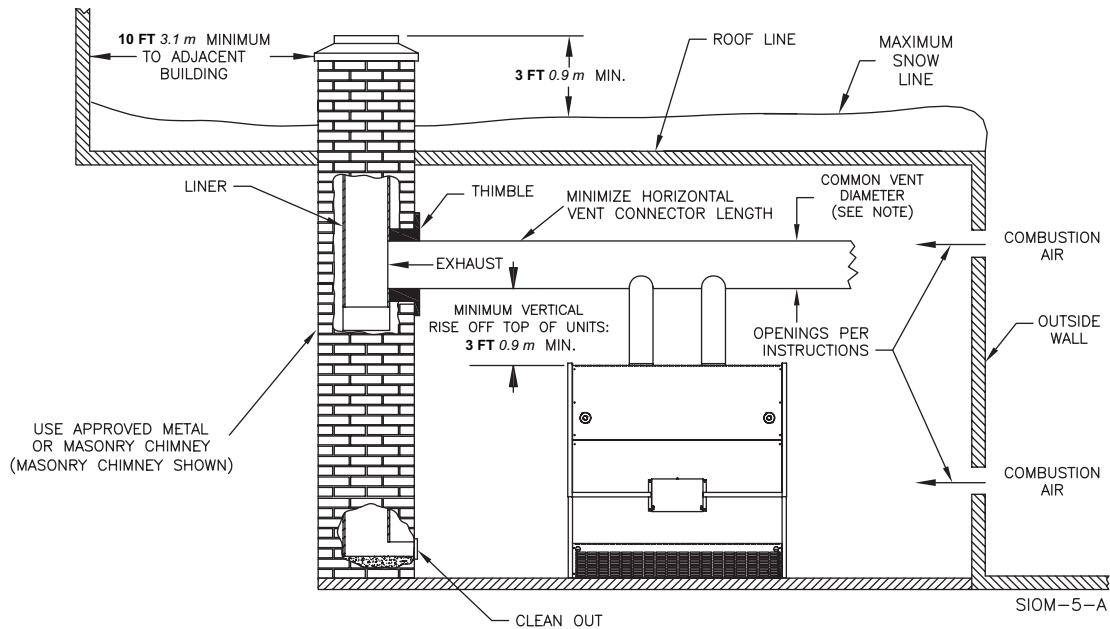




# GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

Figure 2D

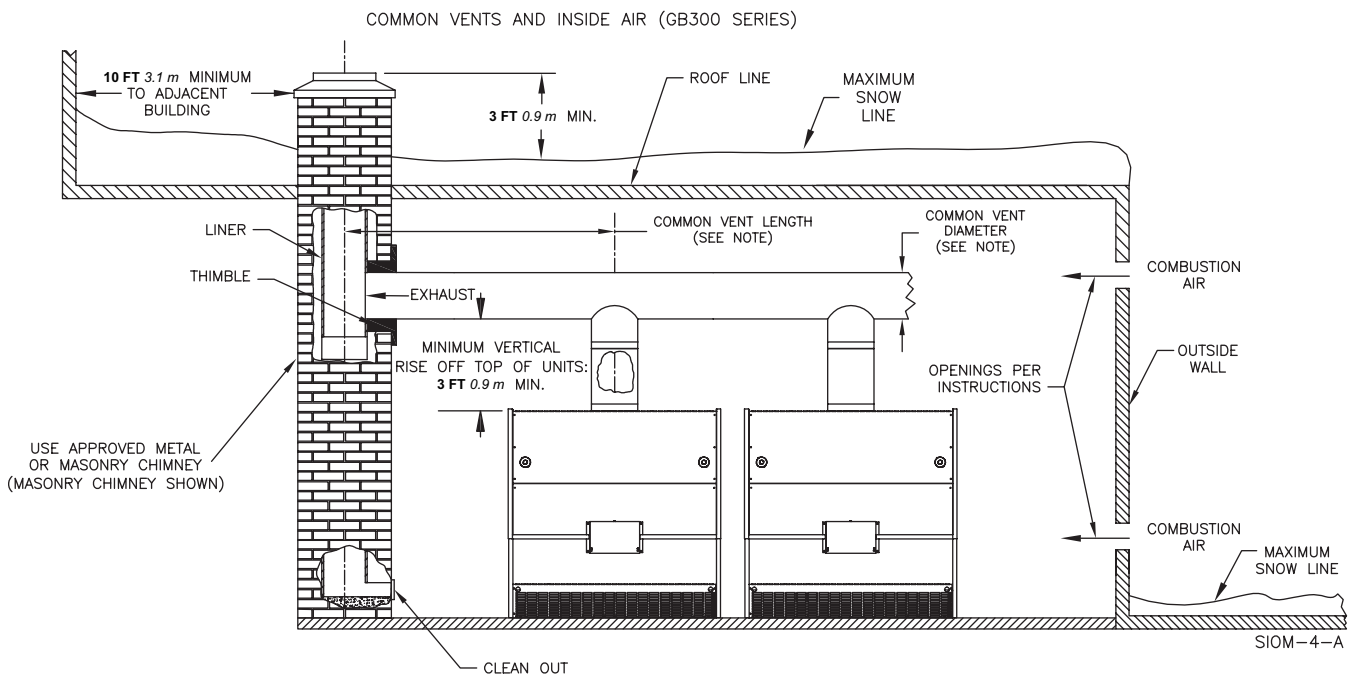
Dual Flue Outlets Using A Masonry Chimney And Inside Air (GB300 Series)



NOTE:  
VENT AND COMBINED MATERIALS, LENGTH AND DIAMETER MUST BE CALCULATED USING THE COMBINED VENTING TABLES IN THE NATIONAL FUEL GAS CODE ANSI Z223.1, LATEST EDITION.

Figure 2E

Common Vents And Inside Air (GB300 Series)



NOTE:  
VENT AND COMBINED MATERIALS, LENGTH AND DIAMETER MUST BE CALCULATED USING THE COMBINED VENTING TABLES IN THE NATIONAL FUEL GAS CODE ANSI Z223.1, LATEST EDITION.

GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

Figure 2F Dual Flue Outlets With Two Boilers Using A Masonry Chimney And Inside Air (GB300 Series)

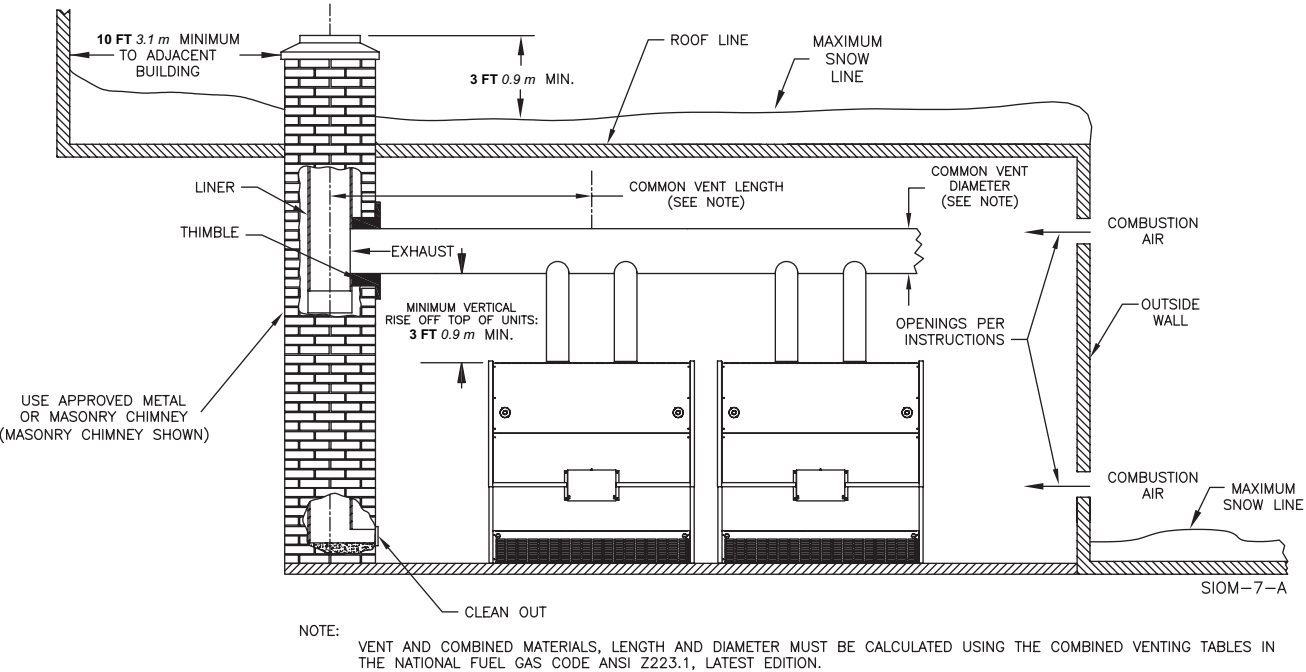
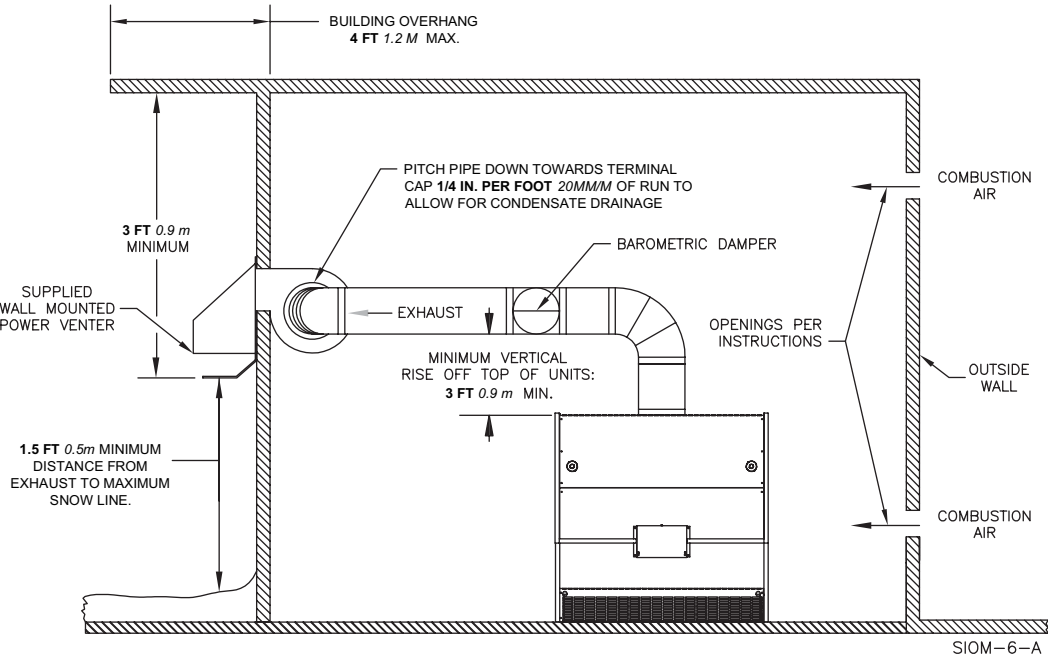


Figure 2G Horizontal Venting And Inside Air (GB300)



# GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

## BOILER ASSEMBLY

Locate the boiler installation site based on the guidelines set forth in the previous pages. A full concrete block foundation is recommended to protect the boiler from moisture and debris. Use solid blocks to support the boiler and hollow blocks for the rest, Figure 1. Align the hollow blocks so air can flow through them.

**WARNING: Never install a GB300(S,W) boiler on top of combustible flooring! Failure to comply with this warning may result in a fire causing property damage, severe personal injury or death!**

### Burner Base Assembly General Instructions

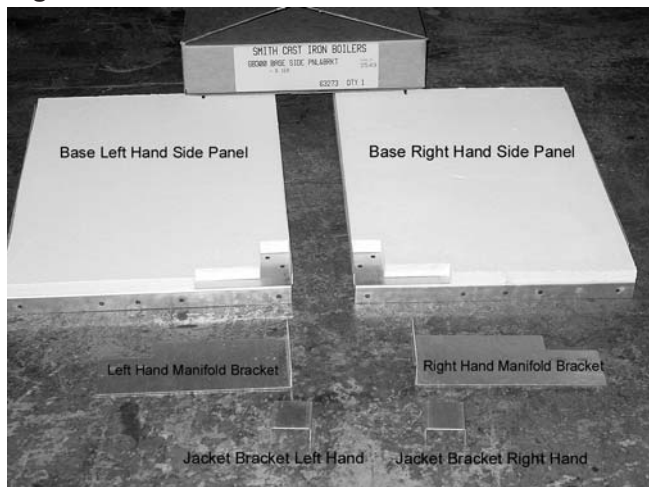
**WARNING: The burner base must be assembled as outlined below. Do not make substitutions for the hardware or materials supplied for the burner base assemblies. Failure to comply with this warning may result in property damage, severe personal injury or death!**

Check the contents of the burner base cartons against the enclosed packing list to ensure that all of the required parts are present. If they are not, contact your Smith Cast Iron Boiler distributor or contact the Smith Customer Service Department.

The burner base panels are factory insulated to simplify field assembly of the burner base.

**Box 63273, Burner Base Side Panels & Brackets**, contains the left & right burner base side panels, manifold brackets and the jacket brackets, **Figure 3**.

**Figure 3** **Burner Base Box 63273**



A box with a number from **63265 to 63272, Burner Base Panels Less Sides**, contains the burner base front and rear panels and the burner base baffle, **Figure 4**.

**Figure 4** **Burner Base Box 63265 to 63272**



The 5/16 stainless steel nuts and bolts used to assemble the burner base panels are supplied in the **X1 box**, that has a number from **72700 to 72707** on it, **Figure 5**.

Use care not to damage or dislodge the ceramic insulation board on the base panels during assembly.

**WARNING: If any of the burner base insulation panels are broken or damaged they must be replaced with factory supplied panels. Failure to comply with this warning may result in property damage, severe personal injury or death!**

**Figure 5** **X1 Box 72700 to 72707**



## GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

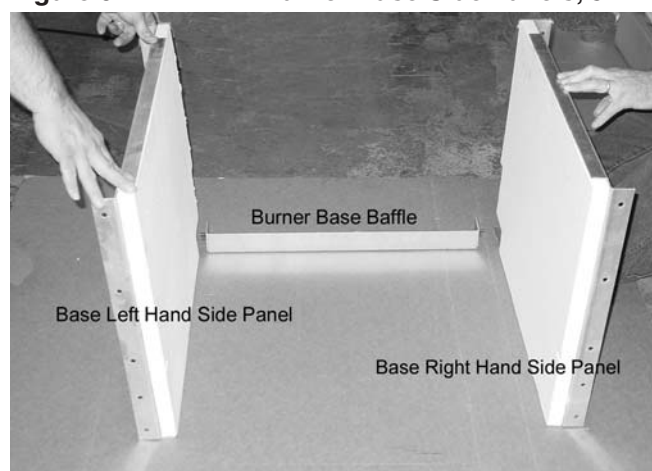
### ***Burner Base Assembly 5 through 12 Sections***

Loosely attach the base baffle to the side panels using 4 5/16 stainless steel nuts. Install the burner base front, side and rear panels as shown in **Figures 6, 7, 8 and 9A**.

Use a spirit level to ensure that the burner base panels are plumb before tightening the stainless steel nuts and bolts.

The factory installed refractory retention bracket(s) must be centered on each piece of refractory board **Figure 9B**. If the bracket is not centered reposition bracket. There is (1) bracket for each section of refractory.

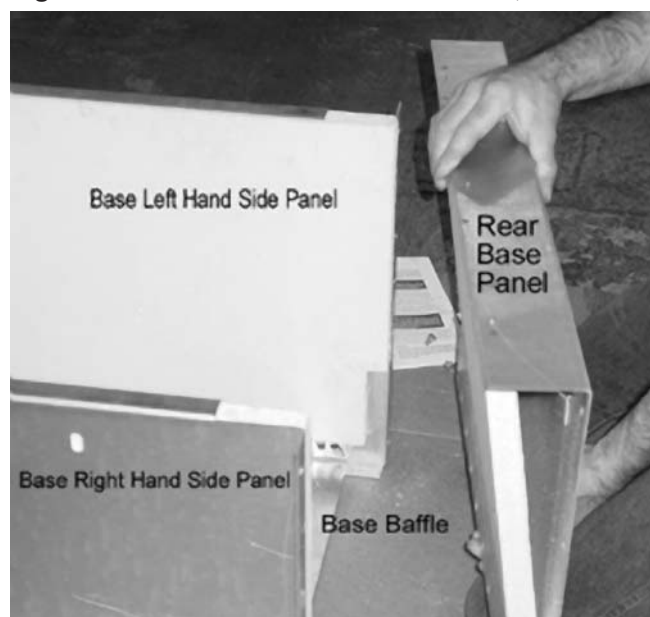
**Figure 6** **Burner Base Side Panels, 5 - 12**



**Figure 7** **Burner Base Front Panel, 5 - 12 Sect**



**Figure 8** **Burner Base Rear Panel Detail, 5 - 12 Sect**



**Figure 9A** **Burner Base Rear Panel, 5 - 12 Sect**



**Figure 9B** **Refractory Retention Bracket**





# GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

**Burner Base Assembly 13 through 21 Sections**  
**Box 72694, X7 Splice Channels**, contains the burner base front, intermediate and rear channels and additional 5/16" nuts and bolts, **Figure 10**.

**Figure 10**

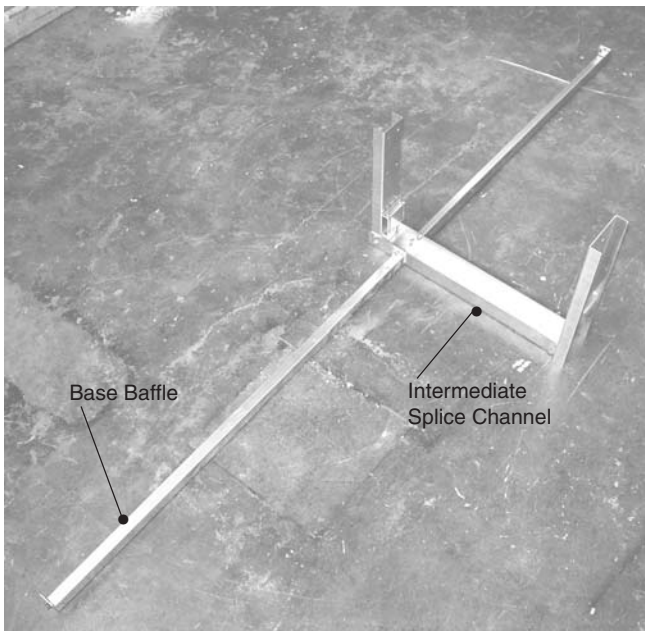
**X7 Box 72694**



The base baffles must be attached to the intermediate base channel before the side, front and rear panels are assembled, **Figure 11**.

**Figure 11**

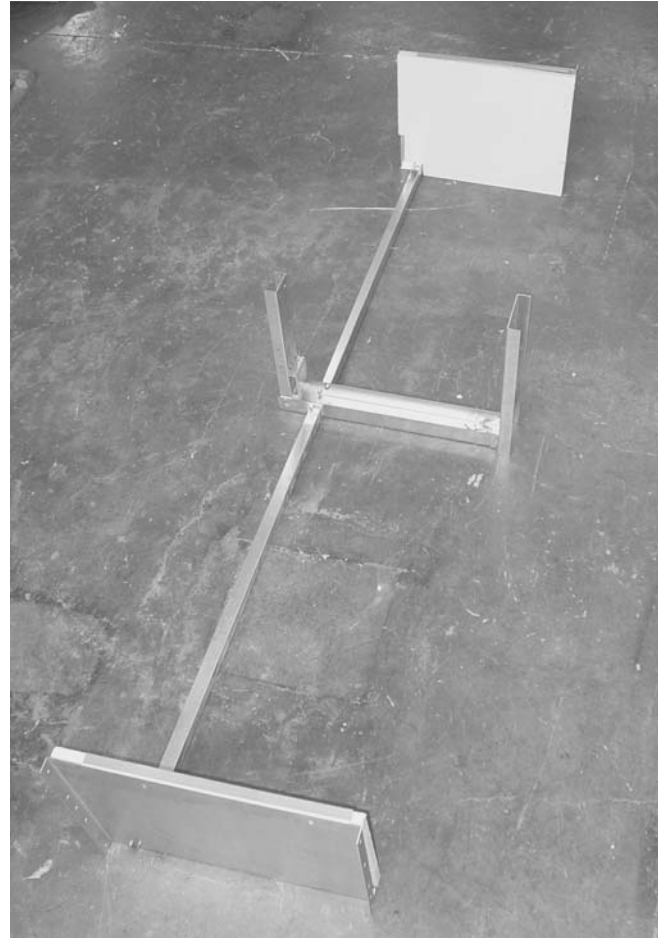
**Burner Base Baffle and Intermediate Splice Channel Assembly 13 to 21 Sections**



With the burner base intermediate channel and baffles level, attach the front and rear channels to the intermediate channel. Bolt the burner base side panels to the base baffles, **Figure 12**.

**Figure 12**

**Burner Base Baffle Front and Rear Splice Channel Assembly 13 to 21 Sections**

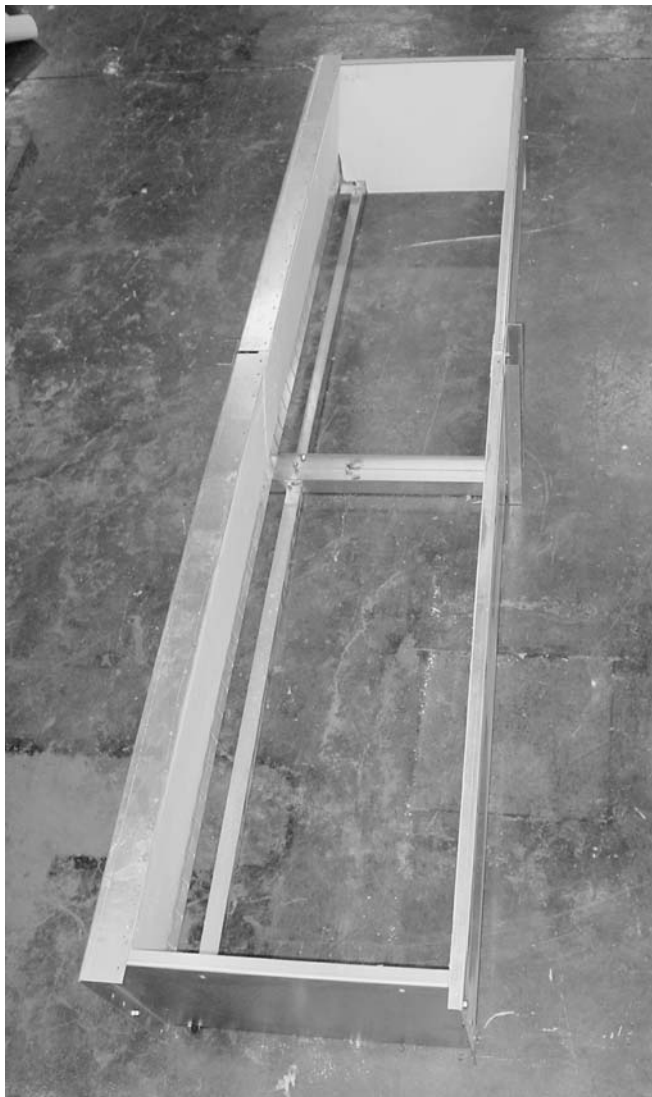


## GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

Bolt the front and rear base panels in place, **Figure 13**.

Center the factory installed refractory retention brackets on the rear base panel so that the bracket is in the middle of each refractory board **Figure 13B**.

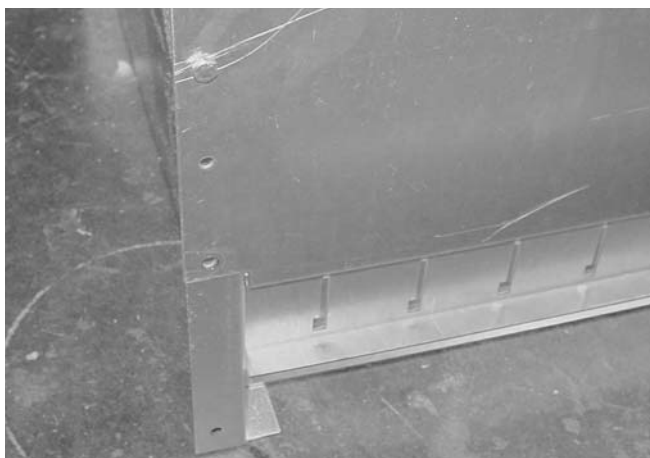
**Figure 13A**      **Burner Base, Side Front and Rear 13 to 21 Sections Panel Assembly**



**Figure 13B**



**Figure 14A**      **Base Rear Channel Bolt Holes**



**Figure 14B**      **Base Rear Channel**



**NOTE:** Do not install the two lower bolts in the base rear panel, **Figure 14A**. These holes are used to attach the base rear channel on 6 -12 section rear panels and 13-21, **Figure 14B**.



# GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

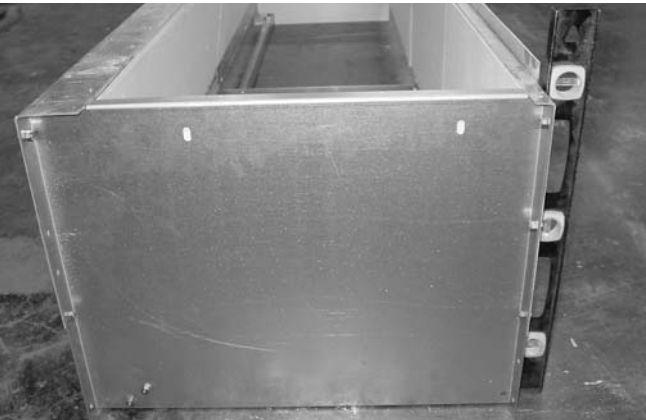
**NOTE:** The base front panels bolt to the inside of the front base splice channel, Figure 15.

**Figures 15** **Base Front Panel Detail**

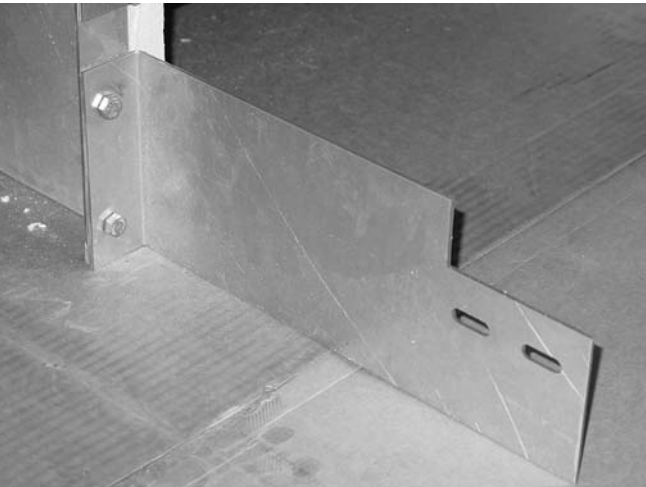


Use a spirit level to plumb the front and rear panels before tightening the nuts and bolts, **Figure 16**. Temporarily attach the manifold brackets and manifold, **Figures 17 and 18**.

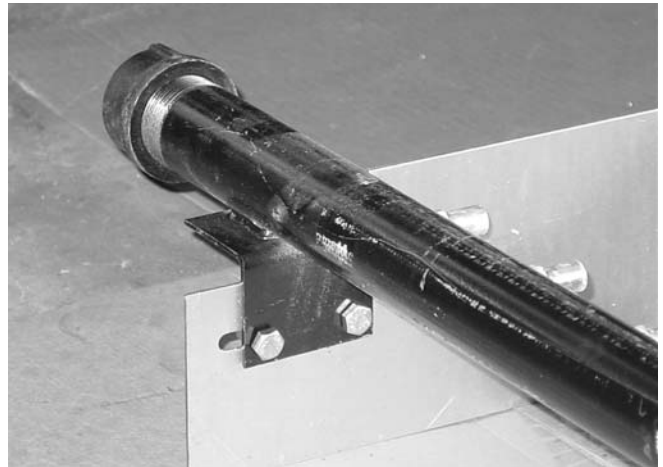
**Figure 16** **Plumbing Base**



**Figure 17** **Manifold Bracket Attachment**

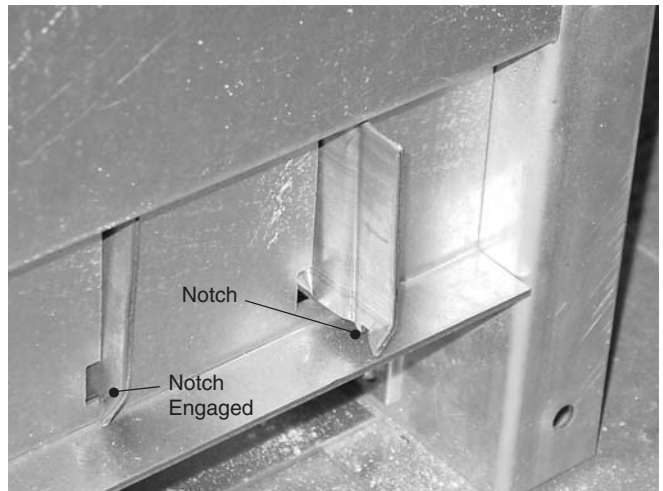


**Figure 18** **Manifold Attachments**



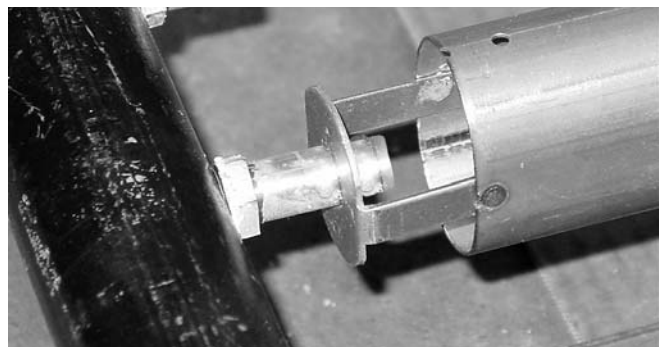
Locate the Burner Box. It is marked with a number from **72724 to 72731**. Install three burner tubes in the base, one on each end and one in the middle. Slide the closed end of the burner tube through the slot in the burner base rear panel. The notch in the burner must engage the burner base rear panel, **Figure 19**.

**Figure 19** **Burner Tube Installation**



Adjust the manifold and base so the burner tube orifice bracket is approximately in the middle of the orifice on all three burners, **Figure 20**.

**Figure 20** **Burner Tube Adjustment**



## GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

Bolt the insulation splice panel bracket to the front base channel, **Figure 21**. Install the two insulation boards in the spaces between the two front and two rear burner base panels. Firmly but carefully press the insulation boards in place and insert the nails through the top and bottom holes, **Figure 22A&B**.

Orientate and install splice refractory retainer. Center the retainer over the splice refractory and mating base panels. The retainer should fit snugly with the flat edge on the outside of the base and the angled edge mating flush to the refractory. Once insulation boards are installed, slide the retention bracket over the top of the base splice as shown in **Figures 22C and 22D**. Tighten all bolts in base.

**Figure 21** Burner Base Splice Panel Bracket



**Figure 22A** Burner Base Splice Insulation Boards



**Figure 22B** Burner Base Splice Insulation Boards



**Figure 22C**



**Figure 22D**



**NOTE:** Check all of the bolts in the base to ensure they are tight before removing the burner tubes and manifold.

# GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

## ***Ceramic Blanket Installation***

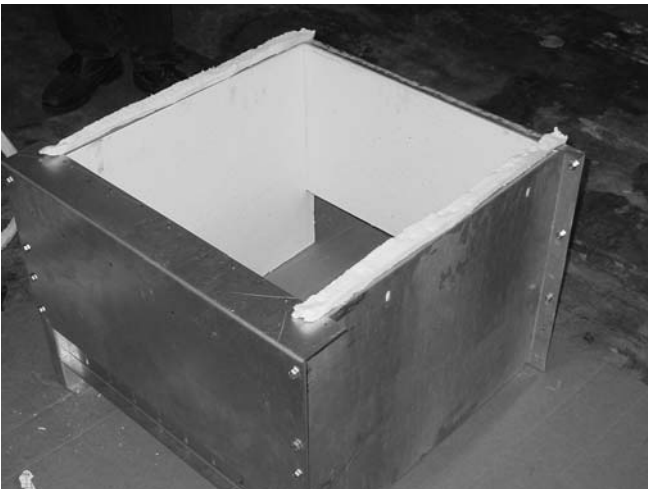
Before installing the cast iron sections a ceramic blanket gasket must be installed on the burner base. Locate the roll of ceramic blanket and can of spray adhesive supplied in the **X1 box**. Spray two heavy coats of adhesive on the top of the burner base waiting for the adhesive to tack up between coats, **Figure 23**.

**Figure 23** Ceramic Blanket Adhesive Application



When the second coat of adhesive is tacky place a strip of ceramic blanket along each side of the base, **Figure 24**.

**Figure 24** Ceramic Blanket Placement

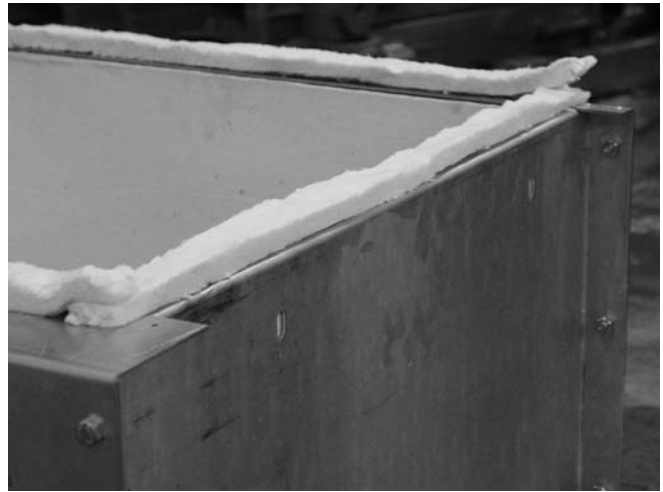


Lay strips of ceramic blanket along the front and back of the base making sure to overlap the ends as shown in **Figure 25**.

**WARNING: The ceramic blanket must be overlapped as shown in Figure 25 to prevent the escape of flue gases. Failure to properly seal the cast iron sections to the boiler base can result in excessive levels of carbon monoxide which can result in severe personal injury or death!**

**Figure 25**

**Ceramic Blanket Placement**



**Cast Iron Section Assembly**

**WARNING: Never stand the cast iron sections up without adequate support. They may fall over resulting in property damage or severe personal injury!**

Clean and inspect each section before assembly. Use a wire brush and a clean rag to remove rust and debris from the rope seal grooves and seal ports.

**CAUTION: Never use any petroleum-based cleaners to clean the cast iron sections. Residue from the cleaner will result in the failure of the hydronic seals!**

Using a tape measure, mark the midpoint of the burner base on the front and rear panels, **Figures 26A and 26B**.

**Figure 26A** Marking Burner Base Front Midpoint





## GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

**Figure 26B Marking Burner Base Rear Midpoint**



Apply two coats of the spray adhesive supplied with the boiler to the rope seal grooves, **Figure 27**. Allow time for the first coat to become tacky before applying the second coat.

**CAUTION: Do not get any of the spray adhesive in the seal ports or premature failure of the seals may occur voiding the warranty!**

**Figure 27 Ceramic Rope Adhesive Application**

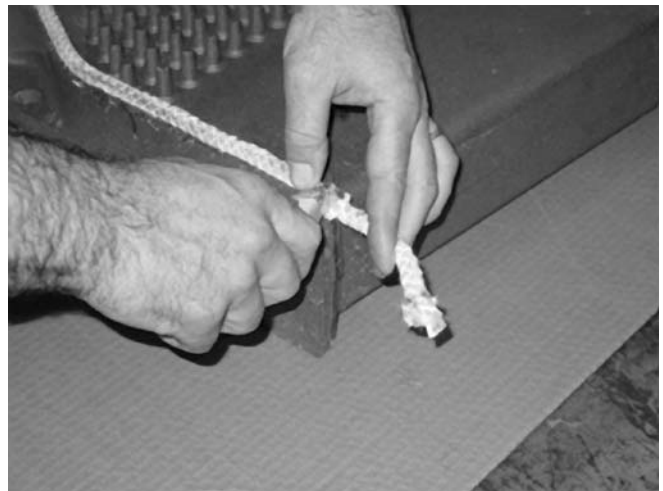


When the second coat is tacky lay the rope seal into the three rope grooves and press in place. Trim the rope off flush with the edge of the cast iron section. The rope seal is to be applied only to one side of each cast iron section, **Figures 28, 29 and 30**.

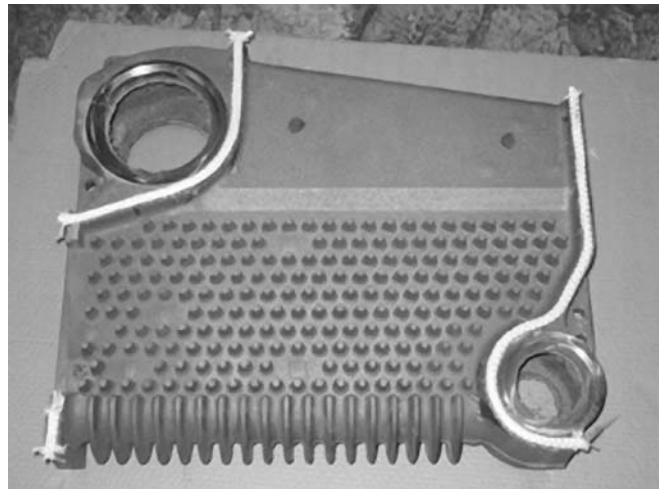
**Figure 28 Ceramic Rope Application**



**Figure 29 Trimming Ceramic Rope**



**Figure 30 Casting w/ Ceramic Rope**



## GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

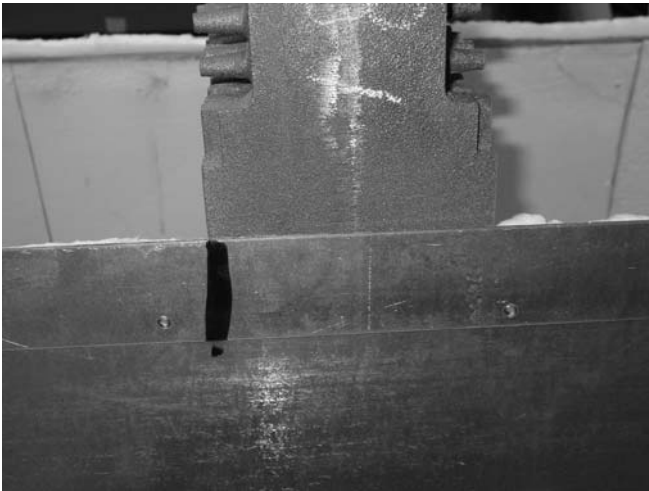
To ensure that the assembled sections will be centered on the burner base the cast iron sections should be assembled from the midpoint of the burner base outward.

On boilers having an even number of sections the first intermediate section should be placed so it's side surface lines up with the midpoint marked on the burner base front and rear panels, **Figures 31 and 32**.

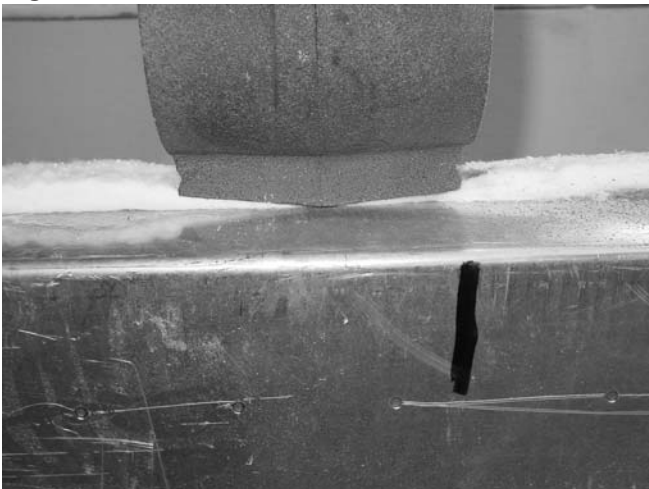
For boilers having an odd number of sections, the centerline of the first intermediate section should line up directly with the midpoint marks on the burner base front and rear panels, **Figures 33 and 34**.

Refer to **Table 3** for the location of the intermediate sections with steam riser tapplings, the flue collector brackets and the front jacket channel bracket. With the rope seal in place set the first section on the base making sure that the section is supported and will not fall over. The large top port should be above the front of the burner base, **Figure 35**. Set the hydronic seals from the **X1 Box** in the port openings before carefully bringing the next section along side of it, **Figures 36 and 37**.

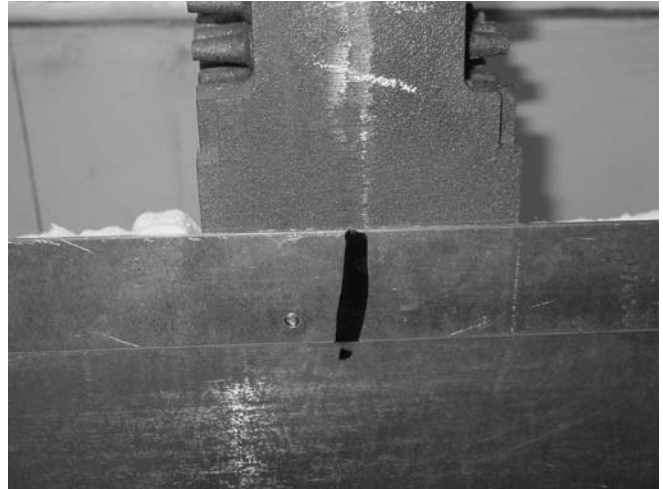
**Figure 31 Front View - Even Numbered Models**



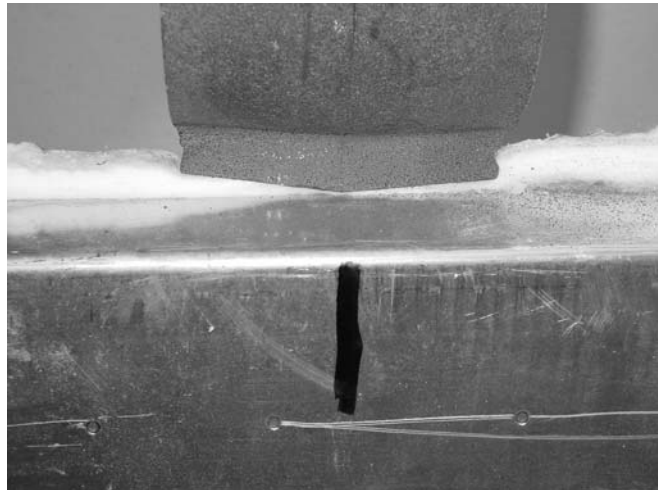
**Figure 32 Rear View - Even Numbered Models**



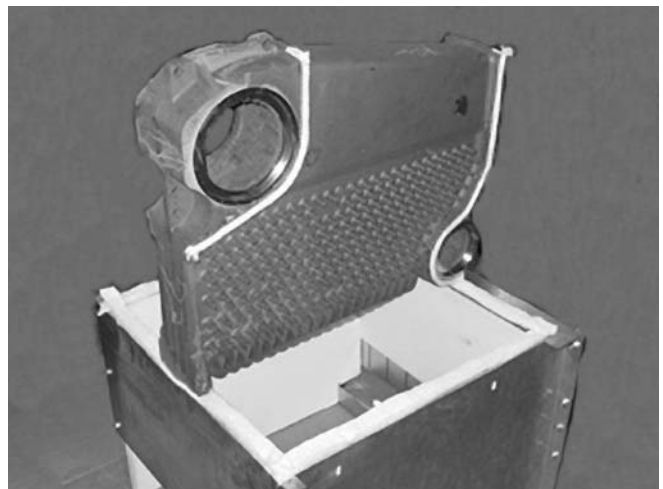
**Figure 33 Front View - Odd Numbered Models**



**Figure 34 Rear View - Odd Numbered Models**



**Figure 35 Section Placement on Burner Base**



**CAUTION:** Do not use adhesives or sealants on the hydronic gaskets. The application of adhesives or sealants may result in the failure of the hydronic seals voiding the warranty!

# GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

**Figure 36 Lower Port Seal Placement**

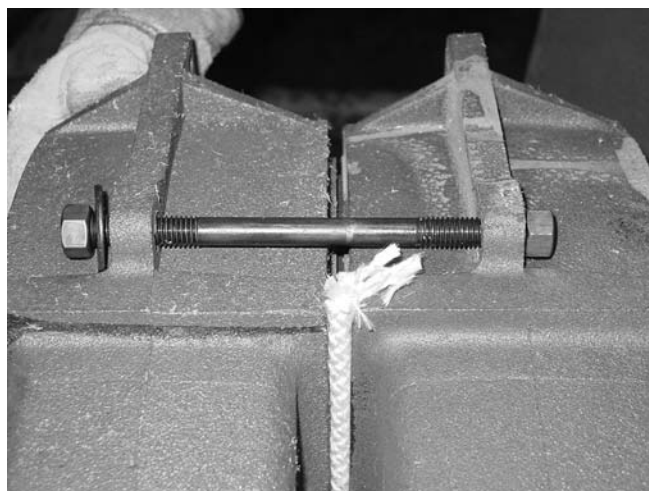


**Figure 37 Upper Port Seal Placement**



Install the draw rods, nuts and washer and slightly tighten the nuts. Only one washer is to be placed on each draw rod, **Figure 38**, to torque sections together.

**Figure 38 Draw Rod Installation**



**Table 3 Steam Riser, Flue Collector Bracket & Jacket Splice Channel Bracket Locations**

Boiler Model	Section Numbered from Left to Right																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
GB300-5	FCB		4P		FCB																
GB300-6	FCB		5P			FCB															
GB300-7	FCB			6P			FCB														
GB300-8	FCB			7P				FCB													
GB300-9	FCB				8P				FCB												
GB300-10	FCB				9P					FCB											
GB300-11	FCB					10P					FCB										
GB300-12	FCB					11P						FCB									
GB300-13	FCB			6P			FCB & JSB			19P			FCB								
GB300-14	FCB			7P			FCB & JSB				20P			FCB							
GB300-15	FCB			7P				FCB & JSB				22P			FCB						
GB300-16	FCB				8P			FCB & JSB				23P				FCB					
GB300-17	FCB				8P				FCB & JSB				25P				FCB				
GB300-18	FCB				9P					FCB & JSB				26P				FCB			
GB300-19	FCB				9P						FCB & JSB				28P				FCB		
GB300-20	FCB					10P						FCB & JSB				29P				FCB	
GB300-21	FCB					10P							FCB & JSB				31P				FCB

## LOCATION OF ITEM

■ - 3" Steam Riser Section Location

FCB - Flue Collector Bracket Section Location

JSB - Jacket Splice Channel Bracket Section Location

#P - Pilot Burner Tube Location

# Represents burner position from LH side of boiler



## GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

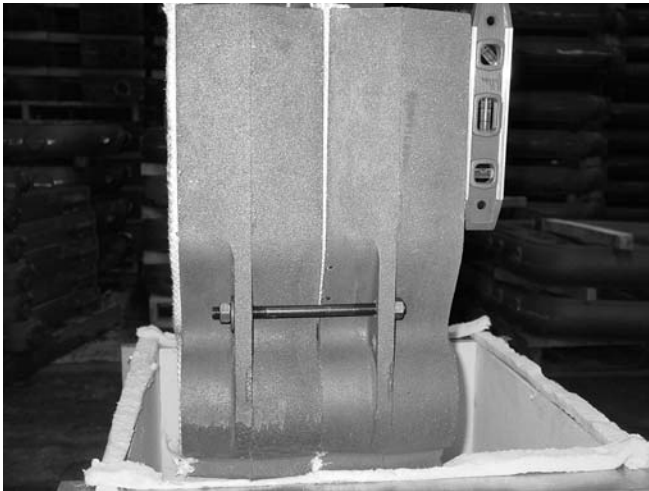
Make sure that the sections are square with the burner base. Align the bottom front edge of the sections so they're flush with the face of the burner base front panel, **Figure 39**. Lift the next section into place being careful not to damage the ceramic blanket or hydronic seals and install the draw rods, washer and nuts.

Use a spirit level to ensure that the first two sections are plumb, **Figure 39**. Once plumb, open the **Flue Collector Box**. The box will have a number from **63203 to 63210** on it, **Figure 40**. Remove the flue baffles and install them as shown in **Figure 41**. **The flue baffles must be inserted so they're as high in the openings as possible.** Once all the flue baffles are installed, evenly torque each washer backed draw rod nut to **30 ft lbs, 42 Nm** **Figure 42**.

**WARNING: The flue baffles must be installed as shown in Figures 40 and 41. The flue baffles must not be changed or altered in any way. Failure to comply with this warning can result in excessive levels of carbon monoxide which can result in severe personal injury or death!**

Repeat this process for the remaining sections. Once the draw rods have been torqued install the four "J" bolts, washer and nuts from the **X1 Box** that fasten the heat exchanger to the burner base, **Figure 43**.

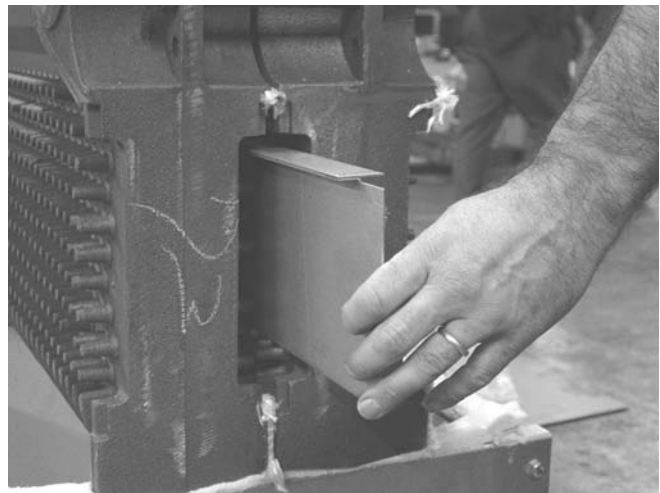
**Figure 39**                      **Confirming Sections Are Plumb**



**Figure 40**                      **Flue Collector Box 63203 to 63210**



**Figure 41**                      **Flue Baffle Placement**



**Figure 42**                      **Draw Rod Torquing - 30 ft/lbs, 42 Nm**



## GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

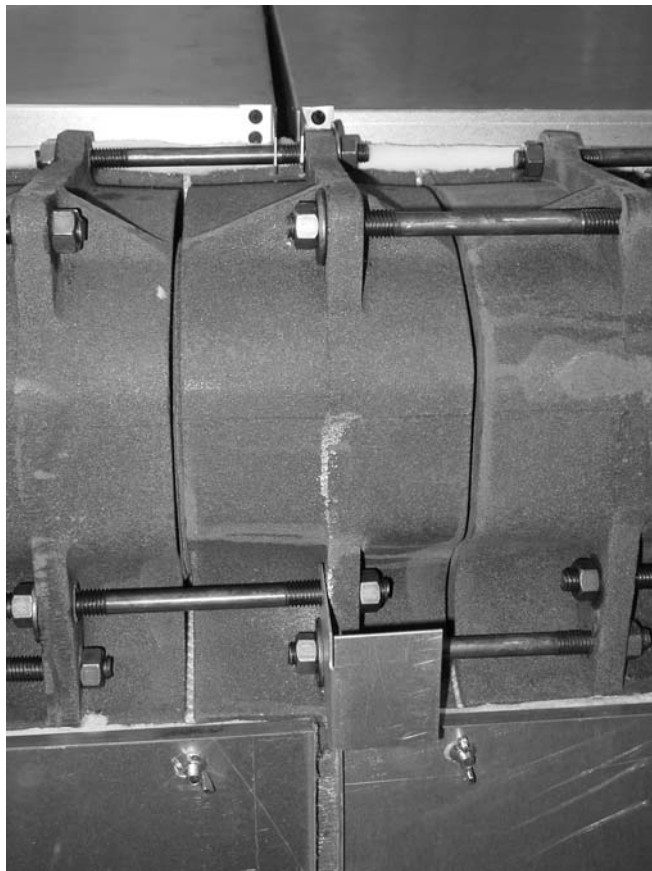
**Figure 43**

**“J” Bolt Installation**



**Figure 45**

**Top Jacket Splice Panel Bracket**



### **CAST IRON PRESSURE TEST**

**NOTE:** Before filling the sections with water temporarily set the flue collector(s) on top of the sections to locate the flue collector brackets, Figure 44. On 13 to 21 section models attach the top jacket splice panel bracket, Figure 45. Also mark the intermediate casting that the flue collectors rest on.

Install a valve in the top and bottom tapping of the left end section to vent any trapped air and allow boiler draining after pressure test completion. Connect a water pressure gage sized for the required test pressure to one of the end castings. Plug all the other tapped openings. Fill the cast iron sections with water leaving the top valve open until all of the air has been bled from the sections.

**Figure 44**

**Flue Collector Bracket Installation**



## GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

**NOTE:** All assembled boiler sections shall pass the hydrostatic tests prescribed in Section IV of the ASME Boiler and Pressure Vessel Code.

**CAUTION:** Do not connect any boiler controls during the pressure test or they will be damaged!

Completed boiler blocks must be tested as follows:

**Steam Boilers** - the assembled boiler sections shall be subjected to a hydrostatic test pressure of not less than **45 psig, 315 kPa**.

**Water Boilers** - the assembled boiler sections shall be subjected to a hydrostatic test pressure of not less than **1 1/2 times the maximum allowable working pressure**.

The hydrostatic pressure shall not exceed the required test pressure by more than **10 psig, 70 kPa** during the test.

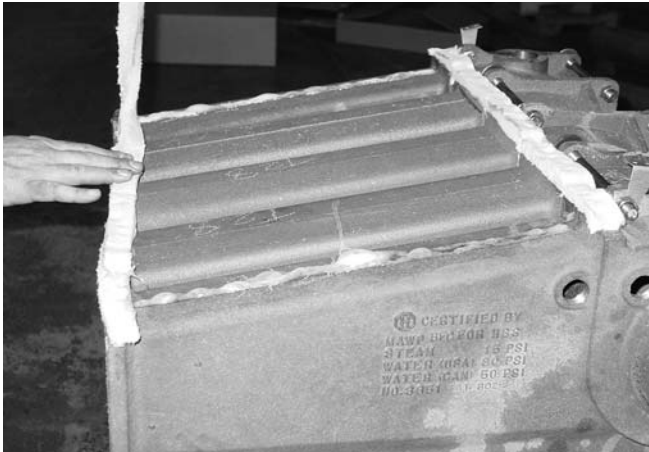
Maintain the test pressure while carefully checking for leaks. If a leak is found it must be eliminated. Once the cast iron sections have proven to be watertight drain them and remove the plugs from any tappings that will be used in service.

### FLUE COLLECTOR INSTALLATION

A single draft hood is used on the 5 through 12 section boilers, two are used on the 13 to 21 section boilers. The **Draft Hood(s)** are packed in a **box** marked with a number from **63187 to 63194**.

Apply two coats of the spray adhesive to the top of the casings where the flue collectors will rest. When the second coat of adhesive is tacky place strips of ceramic blanket on the castings, **Figures 46 and 47A & B**.

**Figure 46** Flue Collector Ceramic Blanket Placement



**WARNING:** The ceramic blanket must be overlapped as shown in Figure 47A & B to prevent the escape of flue gases. Failure to properly seal the flue collector to the boiler sections can result in excessive levels of carbon monoxide which can result in severe personal injury or death!

**Figure 47A** Ceramic Blanket Placement 5-12 Sect.



**Figure 47B** Ceramic Blanket Placement 13-21 Sect.





## GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

Position the flue collector(s) on the boiler sections with the draft hood opening(s) at the rear of the boiler. The sides of the flue collector(s) should lie along the center of each end section, **Figure 48**. Attach the flue collector(s) to the flue collector mounting brackets using the #10 sheet metal screws supplied, **Figure 49**.

Attach the draft hood(s) to the flue collector(s) using the #10 screws provided, **Figure 50**. On the 13 through 21 section boilers it will be necessary to lift one draft hood/flue collector up to install the six screws on the two inner sides, **Figure 51**.

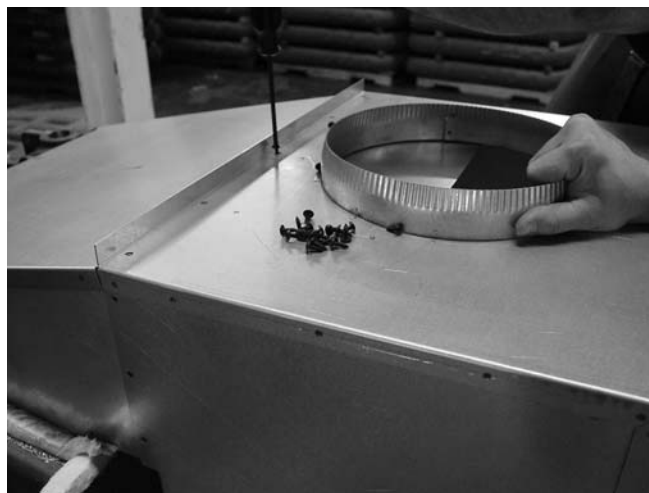
**Figure 48**

**Flue Collector Placement**



**Figure 50**

**Draft Hood Installation**



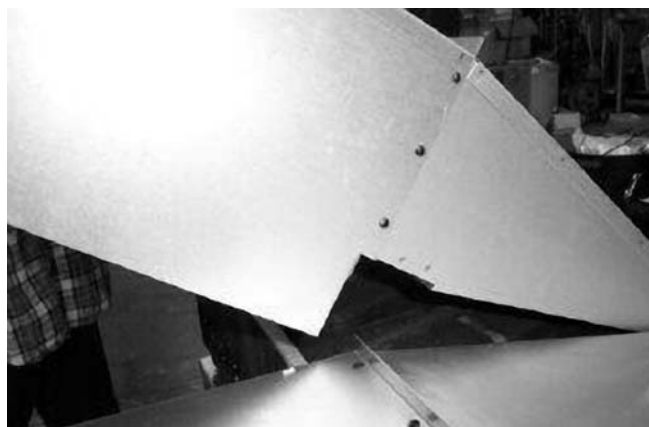
**Figure 49**

**Flue Collector Bracket Installation**



**Figure 51**

**Draft Hood Attachment 13 to 21 Sections**

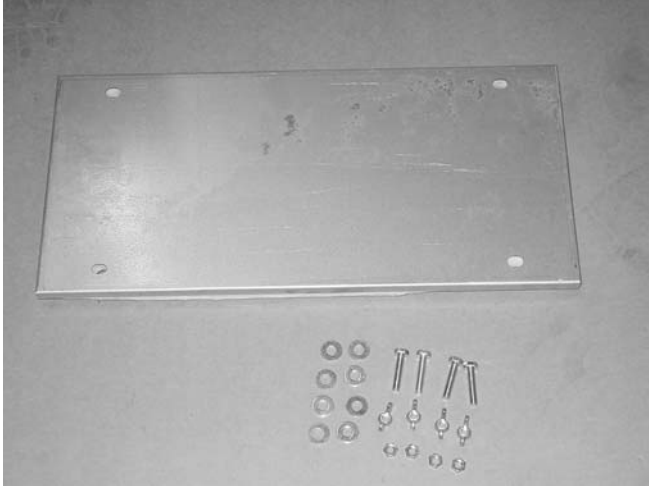


# GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

## Clean Out Covers

The clean out covers and mounting hardware are packaged in the **Burner Box** with a number from **72724 to 72731** on it, **Figure 52**

**Figure 52** Clean Out Cover & Hardware



Arrange the clean out cover(s) in front of the boiler so the mounting stud locations can be determined. Attach the mounting studs to the heat exchanger as shown in **Figures 53 and 54**.

**Figures 53** Clean Out Cover Bolt Assembly

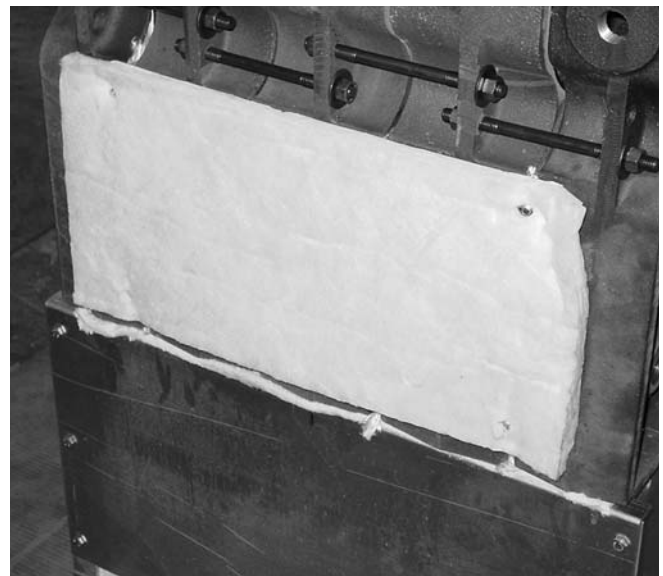


**Figures 54** Clean Out Cover Bolt Location

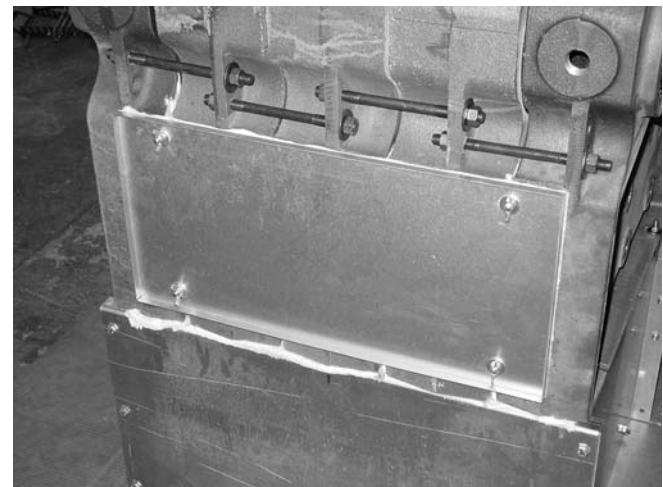


Place the foil-backed insulation over the studs with the foil against the boiler, **Figure 55**. Install the clean out cover(s) so the bent edges face out and hand tighten the wing nuts so the insulation is fully compressed, **Figure 56**.

**Figure 55** Clean Out Cover Insulation



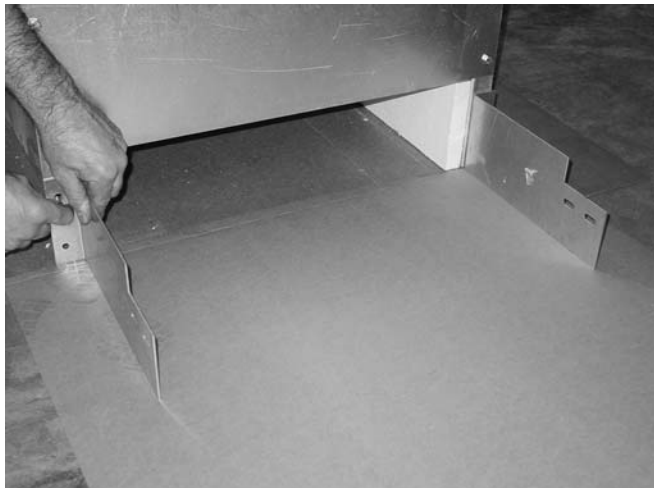
**Figure 56** Clean Out Cover Installation



## GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

**MANIFOLD, BURNER AND PILOT INSTALLATION**  
**Box 63273, Base Panel Sides**, contains the manifold brackets. Bolt the left and right manifold brackets to the front burner base side panel flanges, **Figures 16 and 57**.

**Figure 57** Manifold Bracket Attachment



Place the manifold on the brackets and bolt it to the brackets leaving the 5/16 bolts finger tight, **Figure 58**.

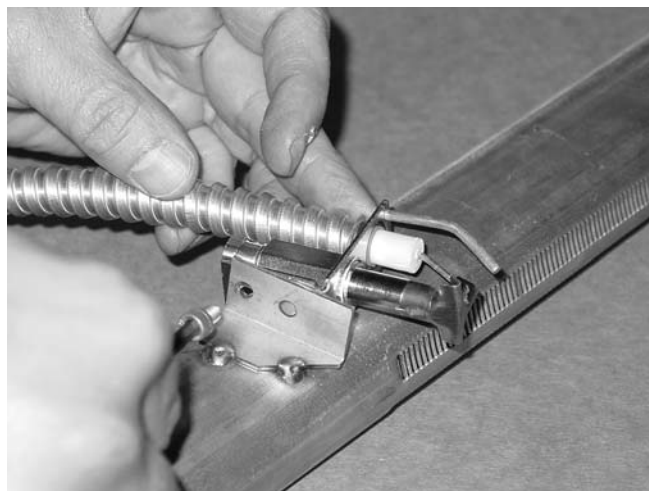
**Figure 58** Manifold Installations



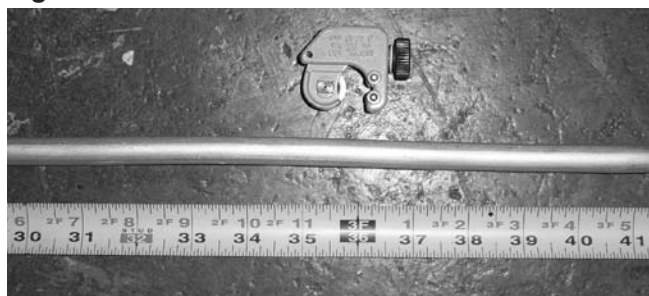
The burners are in the **Burner Box** that has a number from **72724 to 72731** on it. Locate the burner with the pilot mounting bracket welded to it, **Figure 59**. There will be two burners with pilot mounting brackets for 13 through 21 section boilers.

Attach the pilot(s) to the burner tube(s) using the allen head screw(s) provided, **Figure 59**. Remove the roll of 1/4" aluminum tubing and cut an 36" long piece from it, **Figure 60**. Ream and clean the tubing so it's free from burrs.

**Figure 59** Burner Tube w/ Pilot Bkt. and Pilot



**Figure 60** 1/4" Pilot Tube



Insert the tubing into the brass ferule on the pilot and tighten it with a wrench, **Figure 61**. Bend tubing to run parallel to burner tube exiting front of boiler. Avoid tight radius.

**Figure 61** Burner Tube and Pilot Assembly



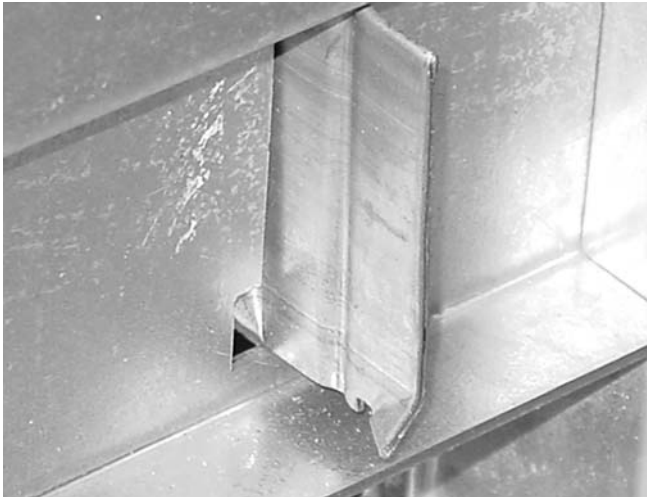


## GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

Install the supplied 1/8" stainless steel bleed line on continuous pilot boilers equipped with V88A gas valves. The bleed line must be located in a fixed position relative to the pilot burner and allowing for the escaping gases to be readily ignited by the pilot. Use the supplied fasteners to connect the bleed line to the valve bleed orifice and to the pilot-mounting bracket on the burner tube. Intermittent pilot boilers must vent the V88A bleed orifice to atmosphere external to the building. The bleed line and provisions to locate the line are supplied by the customer. The bleed line on intermittent boilers does not need to be stainless. Aluminum tubing is recommended, but all installations must follow local laws and codes. The burning vent gas must not in any way affect the pilot flame sensor on the pilot burner. **Follow all applicable local codes.**

Install the burner tubes by sliding the flattened ends through the slots in the rear panel, **Figure 62**.

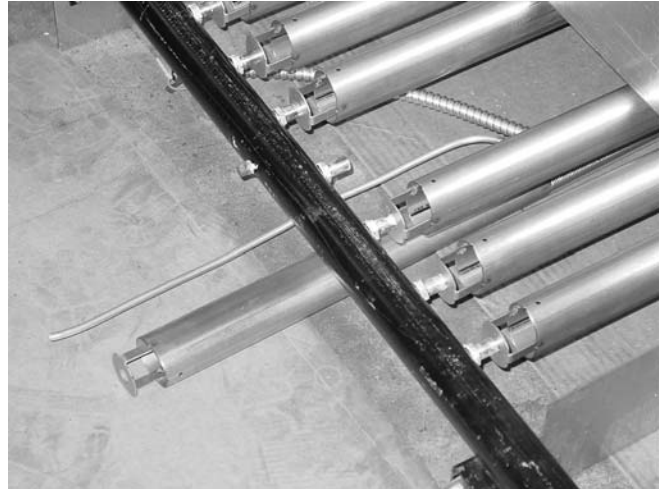
**Figure 62** Burner Tube Through Rear Base Panel



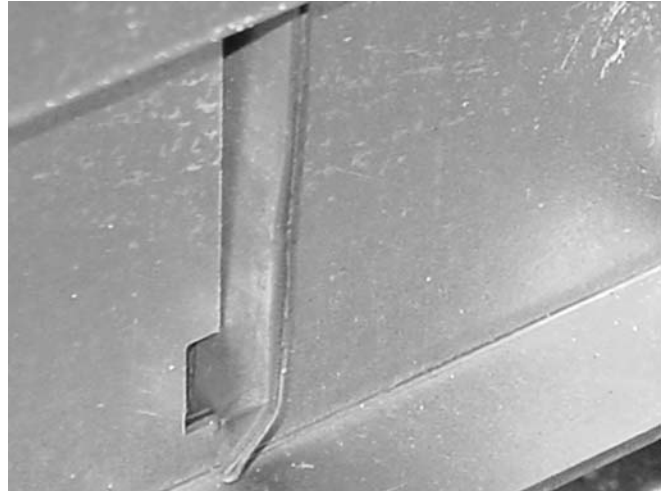
Pull the tubes forward over the brass orifices in the manifold engaging the notch in the flattened part of the burners with rear panel, **Figures 63 and 64**.

**Table 3** has the proper location for the burner tube with pilot assembly(s).

**Figure 63** Burner Tubes on Manifold



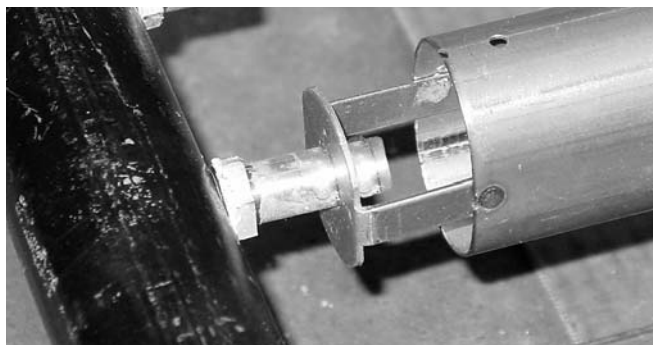
**Figure 64** Burner Tube Locked To Rear Base Panel



## GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

When all of the burner tubes are in place adjust the manifold so the burner tube orifice brackets are positioned midway along the cylindrical portion of the orifice, **Figure 65**. Make sure all of the burner tubes are locked into the base rear panel as shown in Figure 64.

**Figure 65** Burner Tube Placement on Orifice

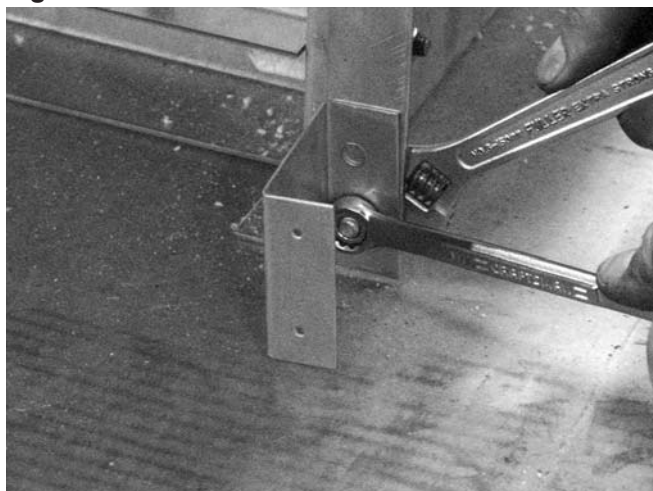


**WARNING:** The burner tubes must be installed as described above. Make sure that the notch on each burner tube is locked into the rear burner base panel, Figure 64. Failure to properly install the burner tubes could result in a fire or explosion causing extensive property damage, severe personal injury or death!

### JACKET INSTALLATION

Bolt the jacket brackets found in Box 63273 to the lower rear flange of the burner base side panels, **Figure 66**.

**Figure 66** Rear Jacket Bracket Attachment



**NOTE:** Before installing the jacket, any nipples, steam risers or short pieces of pipe that will penetrate the jacket should be installed in the cast iron sections. Do not attach any fittings or other devices that would prevent the jacket panels from fitting over them.

**NOTE:** There are two jacket boxes for the 5 through 12 section models. The 13 through 21 section models will come with 4 jacket boxes.

Open the Box(s) that are marked with a number from **55177 to 55184, Jacket Less Sides, Figure 67**, and remove the jacket rear panel(s).

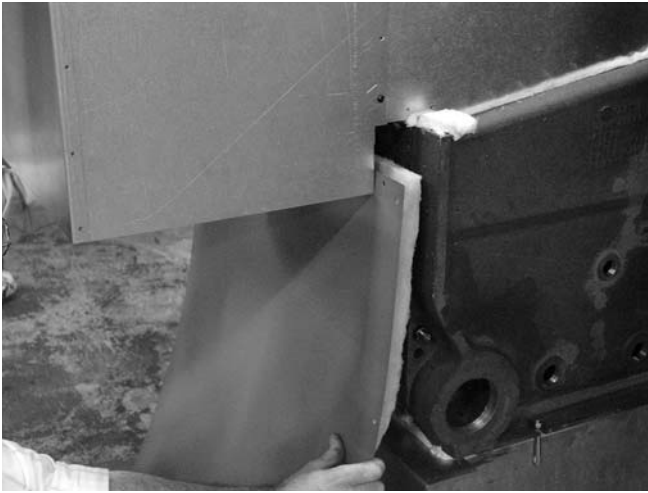
**Figure 67** Box 55177 to 55184, Jacket Less Sides



# GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

The jacket should be assembled using the black screws provided. On 5 through 12 section models slide the rear panel behind the draft hood flanges with the grill side on the floor, **Figures 68, 69 & 70**. On 13 to 21 section boilers open Box 55185, Jacket Splice Box, **Figure 71**. Screw the two rear jacket panels to the rear jacket panel splice panel, **Figure 72**, before sliding the panels behind the draft hoods.

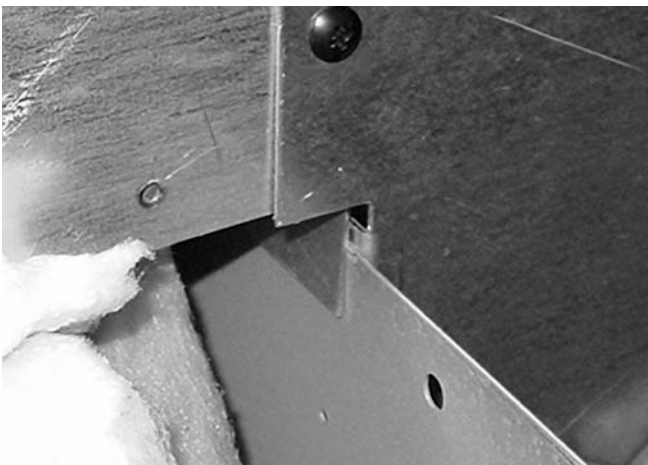
**Figures 68**      **Rear Panel Installation, 5 through 12**



**Figures 69**      **Rear Panel Installation, 5 through 12**



**Figures 70**      **Rear Jacket Panel Installation Detail**



**Figures 71**

**Box 72694, Jacket Splice Box**



**Figures 72**      **Rear Panel Installation, 13 through 21**



Fasten the rear jacket panel(s) to the inner draft hood and flue collector flanges using the holes provided, **Figure 73**.

**Figures 73**

**Rear Panel Installation**





## GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

Remove the left and right jacket side panels from Box 55175, **Jacket Side Panels**. Remove the knockouts necessary to attach the water or steam piping and controls.

**NOTE: All jacket panel joints must be made so the panels are metal to metal. The insulation on the edges of the front, top and rear panels must be pushed behind the side panel flanges before fastening the panel together, Figure 74.**

**Figure 74 Jacket Insulation Detail**



Slip the rear flange of one of the side panels between the rear panel and the jacket-mounting bracket, **Figure 75**.

**Figure 75 Jacket Side Panel Installation**



Fasten the side and rear panels together using the bottom three holes, **Figure 76**. Align the bottom screw hole with the hole in the jacket bracket and fasten them to the bracket. Attach the opposite side panel the same way.

**Figure 76 Jacket Side Panel Installation**



Locate the top jacket panel(s), **Figure 77**.

**Figure 77 Top Jacket Panels**



If the removal of knockouts is required to accommodate any piping they should be removed at this time. Place the rear top jacket panel on top of the boiler, **Figure 78**. On 13 through 21 section boilers two top jacket panels are required. These panels should be screwed to the top splice panel before being placed on the boiler, **Figure 79**. Make sure that the splice panel flanges are between the edge of the top panel(s) and the insulation, **Figure 80**. Attach the edges of the top jacket panel(s) so they are metal to metal with the top flanges on both side panels.

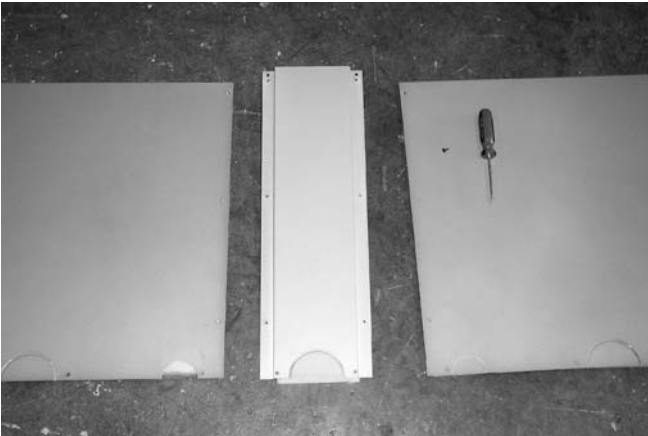


# GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

**Figure 78** Rear Top Jacket Panel, 5 through 12



**Figure 79** Rear Top Jacket Panel, 13 through 21



Install the front jacket top panel(s), **Figures 80 and 81**.

**Figures 80** Front Top Jacket Panel, 5 through 12

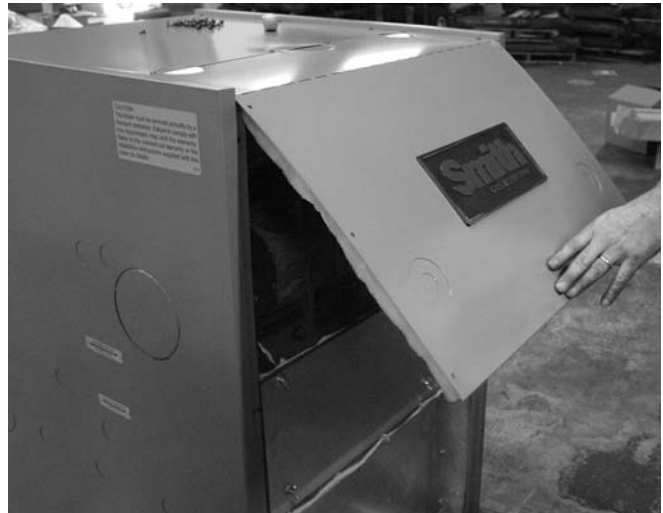


**Figure 81** Front Top Jacket Panel, 13 through 21



Bend the top panel(s) down along the perforation and attach the front portion of the top to the flange edges of each side panel, **Figure 82**.

**Figure 82** Front Top Jacket Panel Detail



## GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

On 13-21 section models a splice kit is required to assemble the front jacket panels. The splice kit is shown in **Figure 71**. The splice panel sits on the splice panel brackets shown in **Figure 45** and **Figure 83**. **Figure 84** shows the upper front splice panel in place. The panels sits on top of the flue collector and is inserted in the bracket mount. The bottom front splice panel mounts to the lower bracket and is fastened to the top splice panel using two jacket screws provided as shown in **Figure 85**.

**Figure 83**

**Splice Panel Brackets**



**Figure 84**

**Upper Front Splice Panel**



**Figure 85**

**Bottom Front Splice Panel**



# GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

Install the front access panels as shown in **Figure 86** 5-12 sect and **Figure 87** 13-21 section using the supplied screws.

**Figure 86** Front Access Panel 5 - 12 Sect

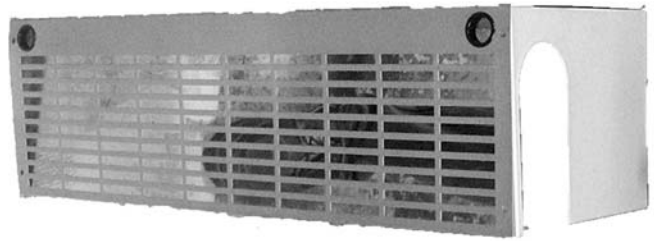


**Figure 87** Front Access Panel 13 - 21 Sect

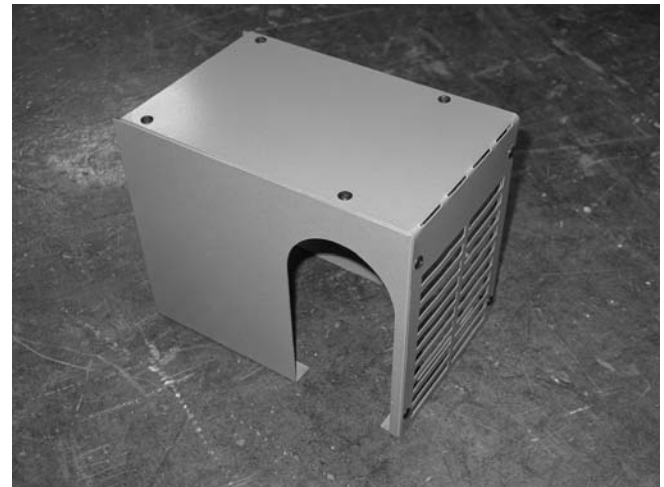


Attach the front grill side panels to the grill top panels as shown in **Figure 88**. There are two grill assemblies and a splice grill for 13-21 section models. Splice grill assemblies exactly like the full size grill panels **Figure 89** The splice grill must be inserted in the middle of the boiler in line with the jacket splice panel. Install grill(s) over manifold and burners, **Figure 90**.

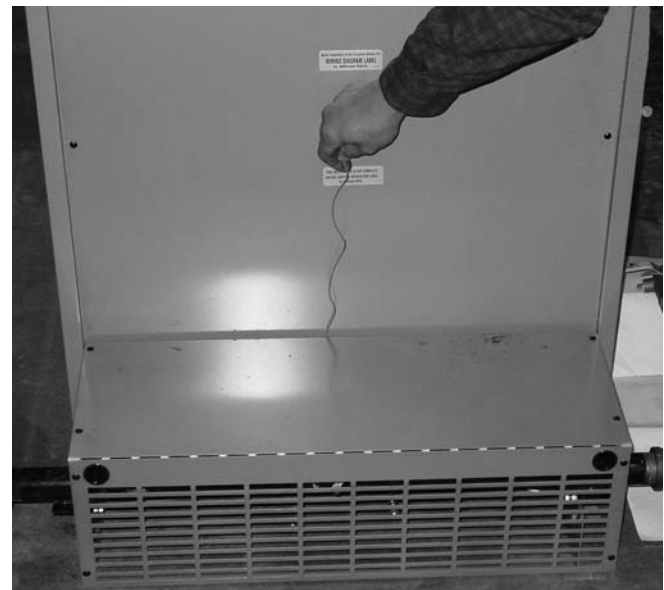
**Figure 88** Grill Assembly



**Figure 89** Splice Grill Assembly



**Figure 90** Installed Grill





## GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

### **Gas Train Assemblies**

All threaded gas train connections must be made using a pipe compound that is resistant to the actions of liquefied petroleum gases. Pipe connections should be secure and tested for leaks. This boiler is designed to allow for the installation of the gas train on either the left or right side of the boiler. Locate the gas train in the most ideal location, but ensure that the train and controls are protected from water and other possible damage. Install the supplied pipe cap on the manifold end opposite the location of the gas train. Install the supplied reducer coupling to the manifold where the gas train will be located.

Refer to the Gas Train Assembly Instructions for a detailed diagram of how the fittings should be arranged and assembled. The instructions are arranged by gas train assemblies. Look up the purchased gas train and confirm all parts for that train are accounted for. Assemble the train as depicted in the instructions. Refer to the GAS SUPPLY PIPING section of this manual to make the final connection to the main gas supply.

For installations in Canada a manual shutoff valve must be installed between the manifold and the first gas valve.

On gas trains with two valves the V88A valve must be installed first (closest to supply), followed by the regulating valve closest to manifold, **Figure 91**. Refer to diagrams in gas train assembly book.

**Figure 91** Gas Train, Valve Orientation

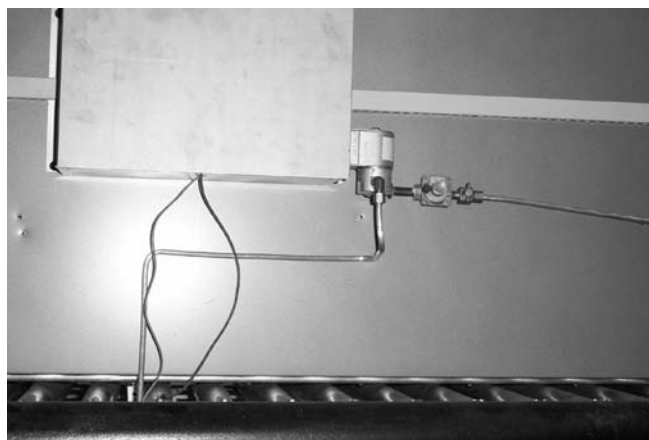


### **Pilot Assembly**

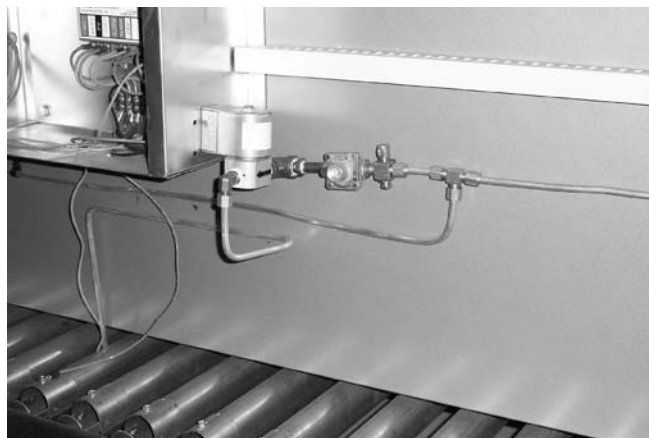
**The pilot assembly must be performed after the installation of the control box.**

The pilot assemblies are fed gas through 1/4" aluminum tubing. The tubing is supplied in a bulk roll and must be cut to fit in the field. Use an appropriate tubing cutter to cut the rolls to length. Debur and clean all cuts to ensure a clean line without blockage or interference. Use a tubing bender to bend the tube and the supplied tubing clamps to fasten it to the boiler jacket. **Figure 92** and **Figure 93** show a recommended layout of the pilot tubing. The gas train instruction manual shows the component layout and how the fittings are arranged on the purchased gas train piping.

**Figure 92** Single Pilot Tubing Run 5 - 12 Sect



**Figure 93** Double Pilot Tubing Run 13 - 21 Sect



For installations in Canada a manual shutoff valve must be installed between the pilots.

The pilot tubing runs must be done in a neat, workman like manner. Use the provided tubing clamps and screws to attach the pilot tubing to the jacket as required.



# GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

## HEATING SYSTEM PIPING

**NOTE: The boiler jacket must be installed before connecting the heating system piping and controls.**

All heating system piping must be installed by a qualified technician in accordance with the latest revision of the ANSI/ASME Boiler and Pressure Vessel Code, Section IV, and ANSI/ASME CSD-1, Standard for Controls and Safety Devices for Automatically Fired Boilers. All applicable local codes and ordinances must also be followed. A minimum clearance of 1" must be maintained between heating system pipes and all combustible construction.

**CAUTION: Improper piping of this boiler can cause flooding and extensive property damage!**

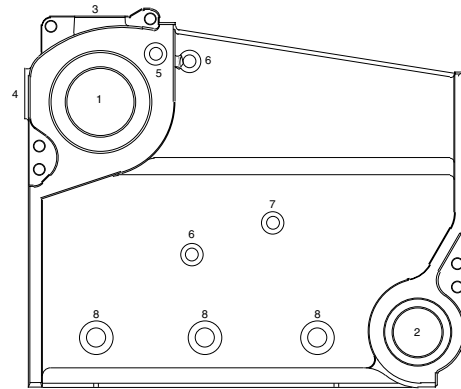
Ensure that the boiler is level from front to back and from side to side. Use metal shims to level the boiler. NEVER use wood, plastic or other combustible materials as shims.

If a boiler is installed above any radiation elements it must be fitted with a low water cutoff device.

### **WATER BOILER PIPING CONNECTIONS**

The supply and return connections should be sized to suit the system, see **Figure 94 & Table 4**. Do not pipe the supply from the bottom port or the return to the top port, the boiler will not work properly.

**Figure 94 Water & Steam Control Tappings**



Tapping	Size	Water	Steam
1	4"	Supply & Optional Tankless Heater	Optional Safety Valve Location & Skim Tapping
2	3"	Return & Boiler Drain/Blowoff	Return & Boiler Drain/Blowoff
3	1-1/2"	Water Relief Valve	Steam Relief Valve & Optional Control Tree Location
4	3/4"	Temp./Pressure Gauge <sup>2</sup>	N/A
5	3/4"	High Limit <sup>2</sup>	Gauge Glass <sup>3</sup>
6	3/4"	Operating Control <sup>2</sup>	Control Tree (see Figure 99)
7	3/4"	Optional Probe LWCO	Optional Probe LWCO <sup>3</sup>
8	1"	Optional Float LWCO's	Optional Float LWCO's <sup>3</sup>

**Notes:**

1. The left end section contains the same tappings as the right end section.
2. These controls must be located on the supply piping side of the boiler.
3. These controls must be located on the steam equalizer piping side of the boiler.

GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

Table 4 Supply & Return Pipe Sizing

Boiler Model	Supply Size (in)	Return Size (in)
5 - 10 section	3"	3"
11 - 21 section	4"	3"

Install the Pressure Relief Valve in the 1 1/2 NPT opening in the top of the end section opposite the gas controls. Pipe the discharge of the Pressure Relief Valve to prevent scalding in the event of a discharge, see **Figure 93**. The discharge piping must be sized the same as the Pressure Relief Valve outlet.

**CAUTION:** If the relief valve must be installed on the same end as the gas controls, provisions to protect the controls from water in the event of a discharge must be made.

Locate the Theraltemeter, Low Water Cutoff Device, Hi Limit Control and Operating Control per **Figures 94 & 95**. Optional controls must be installed in accordance with the control manufacturers instructions and **Figure 94**.

Piping For Use With Cooling Units

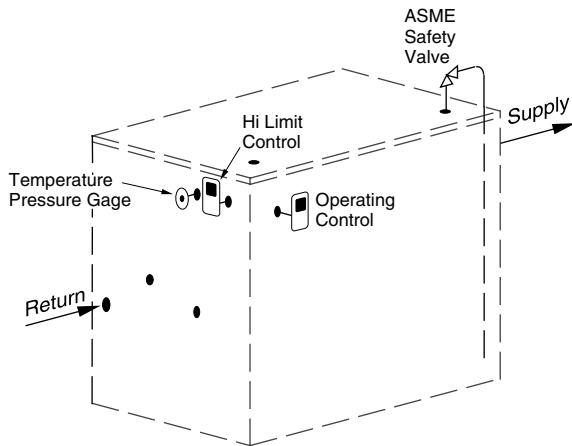
The boiler, when used in connection with a refrigeration system, must be installed so the chilled medium is piped in parallel with the boiler. Appropriate valves must be used to prevent the chilled water from entering the boiler.

When a boiler is connected to a heating coil that may be exposed to refrigerated air from an air handling device, the piping system must be equipped with flow-control valves or some other automatic means of preventing gravity circulation of the boiler water during the cooling cycle.

Steam Boiler Piping Connections

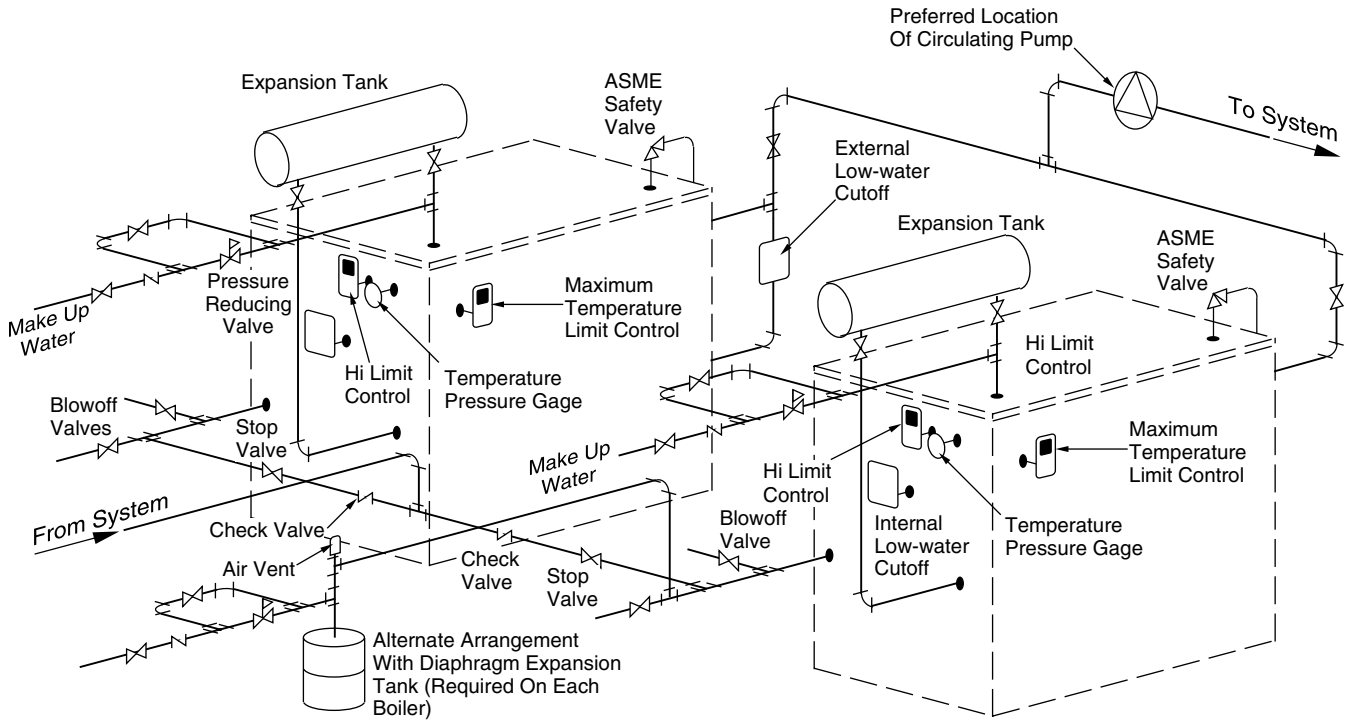
**Table 3**, contains the steam riser location schedule. Riser, equalizer and header pipe sizes are located in **Table 5**. A typical single boiler piping arrangement is shown in **Figure 95**. **Figures 97 & 97A** contain typical piping diagrams for steam boilers in battery. The steam piping should be pitched so the condensate flows in the direction of steam travel.

Figure 95 Single Water Boiler Piping

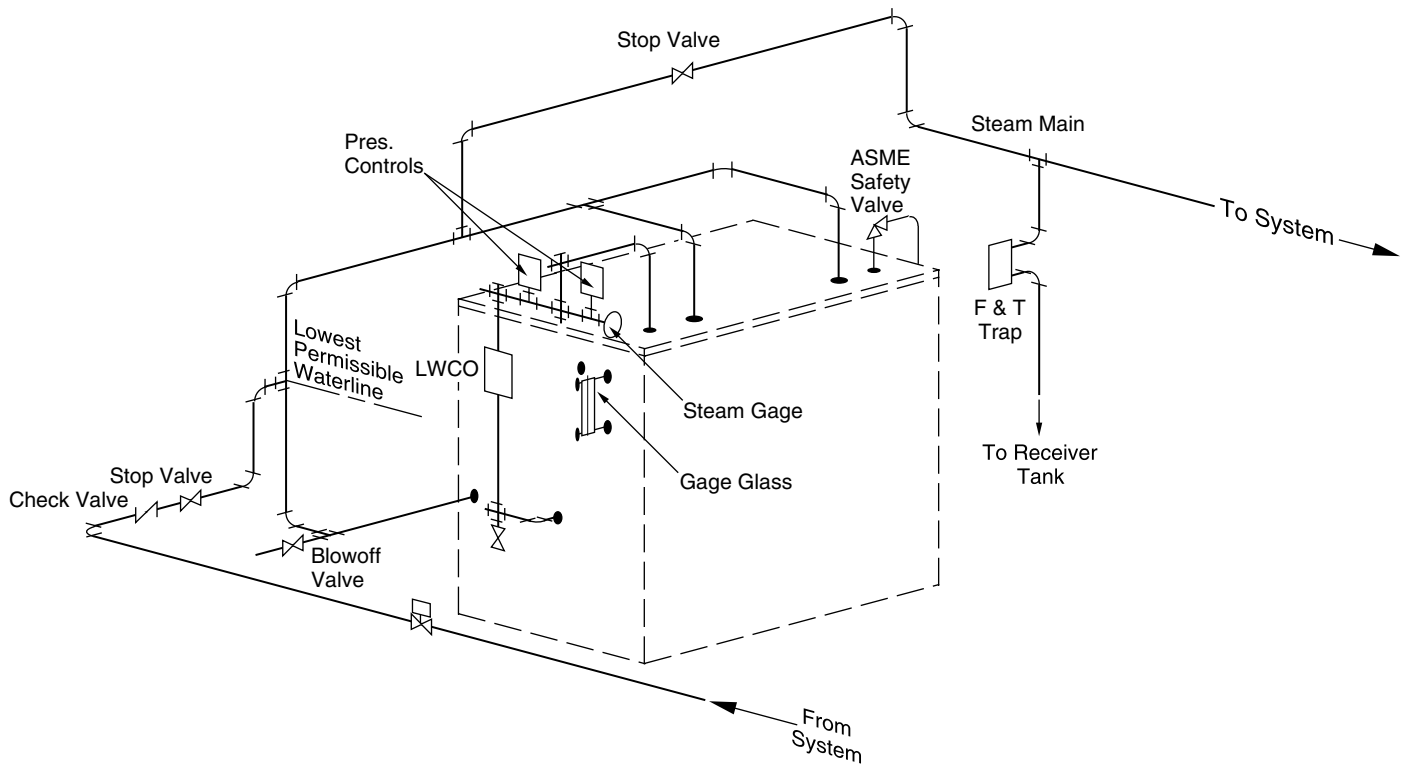


# GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

**Figure 97 Water Boilers in Battery**



**Figure 97A Typical Single Boiler Steam Piping**



GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

Figure 98 Typical Steam Piping - Gravity Return for Multiple Boilers

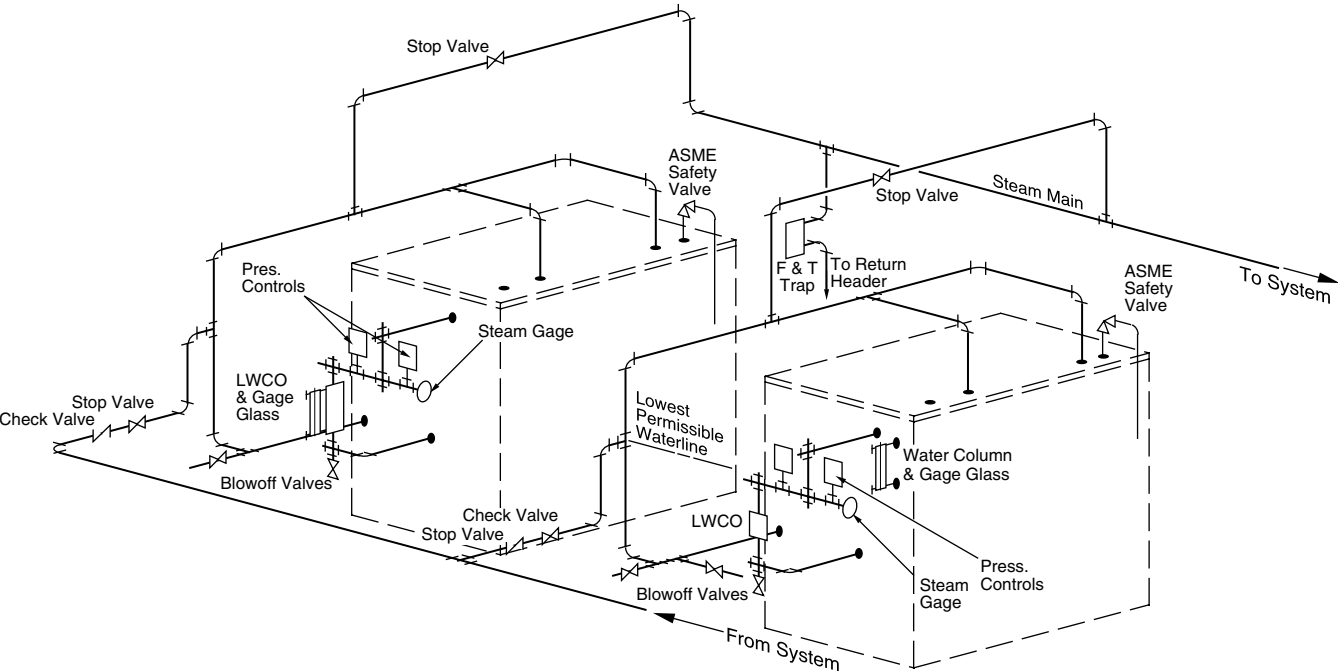
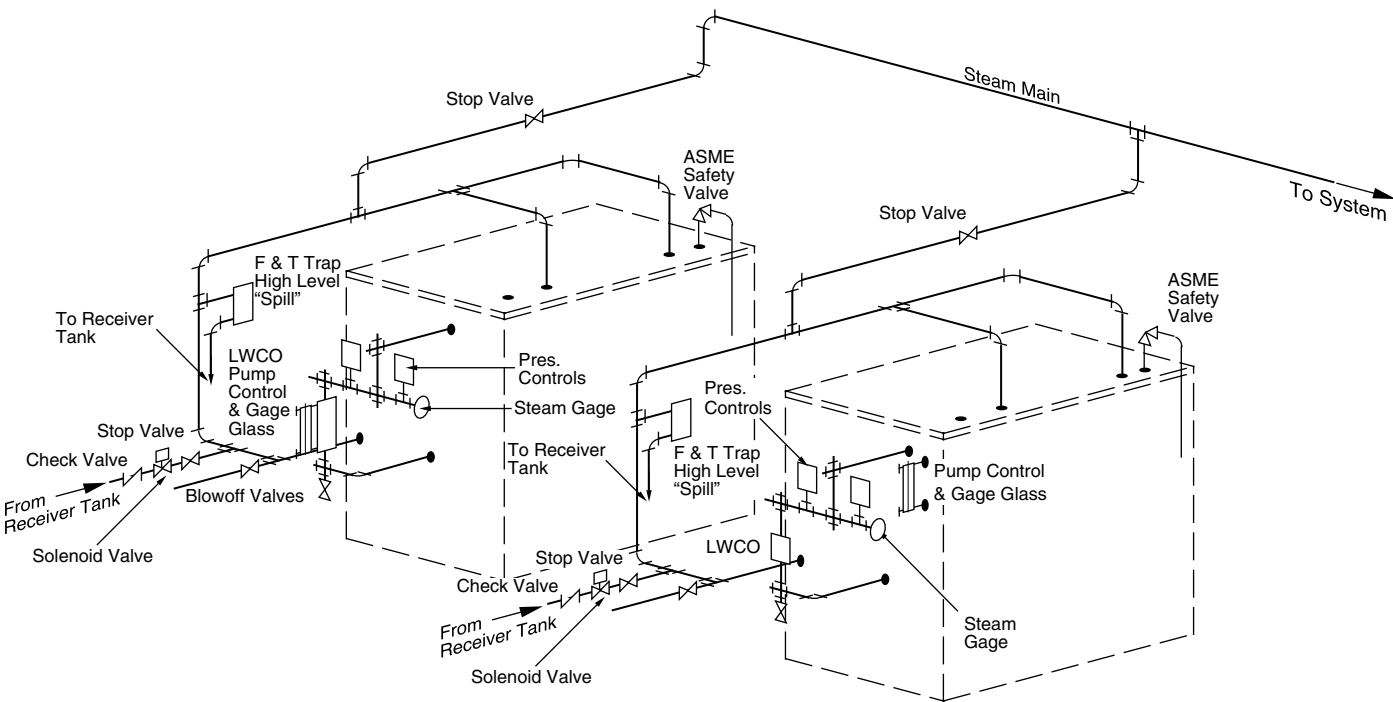


Figure 98A Typical Steam Piping - Pumped Return for Multiple Boilers





# GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

**CAUTION: Make up water connections must be made to the return piping, not directly to the boiler or boiler damage may result.**

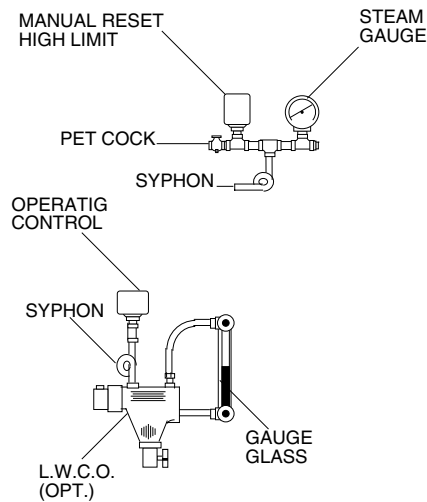
Locate the boiler blow off preferably opposite the return piping connections. Blow off valves must be sized equal to, or larger than, the steam relief valve. Any discharge piping is to be full size to the point of discharge.

Assemble the control tree and low water cutoff as shown in **Figure 99**. Use **Figure 94** to locate the control tree and low water cutoff on the boiler.

**Table 5 Riser, Equalizer & Header Pipe Sizes**

Boiler Model	Risers	Equalizer	Header
GB300-5 to -9	1 @ 3"	1-1/2"	3"
GB300-10 to -15	2 @ 3"	2"	4"
GB300-16 to -21	3 @ 3"	3"	5"

**Figure 99 Steam Control Tree**



## GAS SUPPLY PIPING

**WARNING: Check the boiler rating plate to make sure that the boiler is for the type of gas that will be used. If it isn't, do not connect the boiler to the gas supply. Failure to comply with this warning can result in extensive property damage, severe personal injury or death!**

The GB300(S,W) boiler comes from the factory ready to be piped to the gas supply. If for any reason the boiler is not for the type of gas available at the installation site, call the nearest Smith Cast Iron Boiler distributor to resolve the problem.

**Table 6** should be used to ensure that the gas supply piping is sized properly. If more than one appliance is supplied by the same supply pipe, the piping must be sized based on the maximum possible demand. Do not neglect the pressure drop due to pipe fittings. **Table 6** should be used in conjunction with **Table 7** to ensure that the supply piping has the capacity to meet the demand.

**Table 6 Gas Pipe Capacity**

Maximum pipe capacity in ft<sup>3</sup>/hr based on 0.60 specific gravity gas at a pressure of 0.5 psig or less and a 0.3" WC pressure drop.

Nominal Iron Pipe Size, (in)	Pipe length in feet							
	10	20	30	40	50	60	80	100
1"	520	350	285	245	215	195	170	150
1-1/4"	1050	730	590	500	440	400	350	305
1-1/2"	1600	1100	890	760	670	610	530	460
2"	3050	2100	1650	1450	1270	1150	990	870
2 1/2"	4800	3300	2700	2300	2000	1850	1600	1400
3"	8500	5900	4700	4100	3600	3250	2800	2500

Note:

Multiply the gas volume by 0.62 for propane flow capacity in ft<sup>3</sup>/hr. Multiply the propane flow capacity by 2500 Btu/ft<sup>3</sup> to determine the propane Btu/hr capacity for a given pipe size and length.

**Table 7 Equivalent Pipe Length Chart**

Nominal Iron Pipe Size, (in)	Type of pipe fitting			
	90 Elbow	Tee <sup>1</sup>	Gate Valve <sup>2</sup>	Gas Cock <sup>2</sup>
1"	2.6	5.2	0.6	1.5
1-1/4"	3.5	6.9	0.8	1.9
1-1/2"	4.0	8.0	0.9	2.3
2"	5.2	10.3	1.2	3.0
2-1/2"	6.2	12.3	1.4	3.7
3"	7.7	15.3	1.8	4.5

Notes: 1. For flow through branch.

2. For flow at full open.

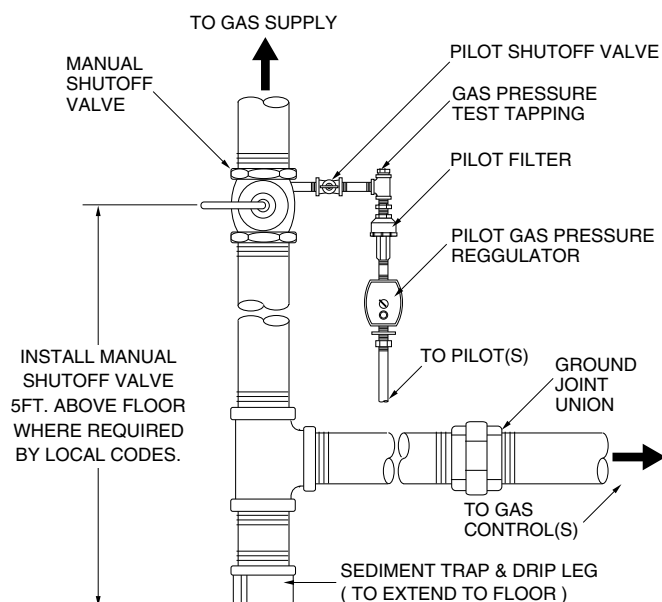
**Figure 100** depicts the proper way to connect the boiler to the gas supply piping. The manual shut-off valve **MUST** be installed in the supply piping. It should be approximately 5 feet above the floor. Provide a sediment trap at the bottom of the vertical section of the gas supply pipe upstream of the gas controls. A ground joint union should be installed between the boiler gas controls and the supply piping. Each of these items are needed to ensure long life and ease of servicing. Always use a pipe sealant that is suitable for use with LP gas.

**CAUTION: Always use a wrench on the gas valve body when making gas connections to it. Never over-tighten the piping entering the gas valve body or gas valve failure may result!**

# GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

Figure 100

## Gas Supply Piping



When applicable, provisions for vent, bleed and gas relief lines must be made in accordance with the latest revision of ANSI Z223.1.

Safe lighting and other performance criteria were met with the gas manifold and control assembly provided on the boiler. All gas connections **MUST** be leak tested before putting the boiler into operation.

**WARNING: Never use an open flame to test for gas leaks. Always use an approved leak detection method. Failure to comply with this warning can cause extensive property damage, severe personal injury or death!**

Whenever the gas supply piping is pressure tested the boiler gas controls must be protected. If the test pressure is equal to, or less than 1/2 psig (3.5 kPa) isolate the boiler by closing its manual shut off valve. If the test pressure is greater than, or equal to 1/2 psig (3.5 kPa), disconnect the boiler and its individual shut-off valve.

## ELECTRICAL WIRING

### Electrical Power Connections

**CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation! Verify proper operation after servicing.**

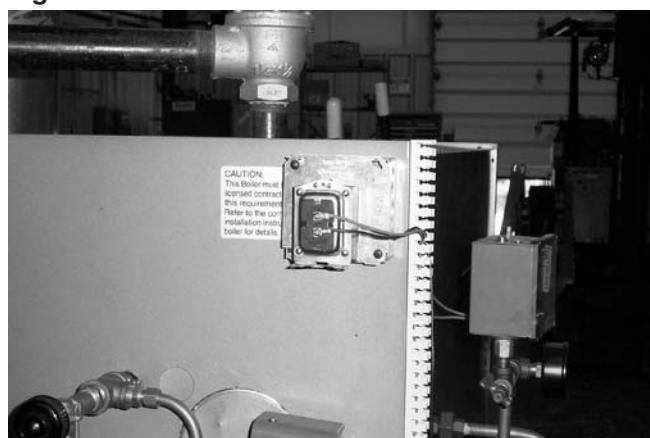
The electrical connections to this boiler must be made in accordance with all applicable local codes and the latest revision of the National Electrical Code, ANSI/NFPA-70. Installation should also conform with CSA C22.1 Canadian Electrical Code Part I if installed in Canada. Install a separate 120 volt 15 amp circuit for the boiler. A shut-off switch should be located at the boiler. The boiler must be grounded in accordance with the authority having jurisdiction, or if none, the latest revision of the National Electrical Code, ANSI/NFPA-70.

Line voltage field wiring of any controls or other devices must conform to the temperature limitation of type T wire at 95°F(35°C) above room temperature. Use copper conductors with a minimum size of #14 awg.

The incoming line voltage is connected to the boiler using the supplied junction box and transformer. All high voltage connections must be contained inside the junction box leaving only 24 volt termination exposed. The junction box **MUST** be located on the side where the boiler controls are located and on the jacket panel in the upper right hand corner (1/2" max from the top and 1/2" max from the front side of the jacket panel). Failure to mount the junction box and transformer in this area will cause wire harness length to not be of the proper size, resulting in the inability to connect the termination points and harnesses together. See Figure 101 Transformer Location.

Figure 101

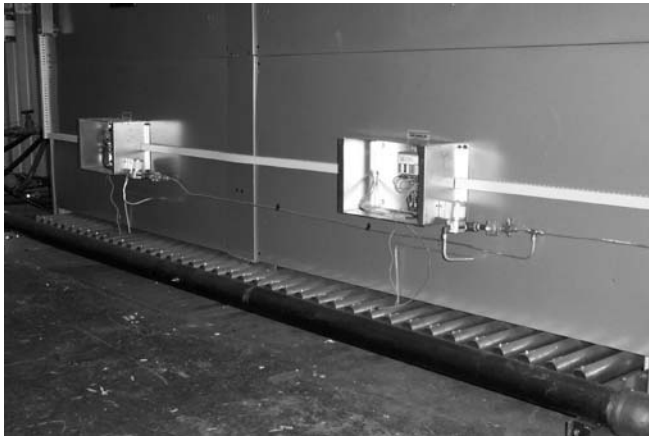
### Transformer Location



# GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

Use the factory supplied wiring schematic booklet to connect power to the boiler. The schematic booklet also depicts how to interconnect the boiler controls, using the supplied wire harness. Before connecting any harnesses, the control panel and wire duct must be attached to the boiler using the supplied fasteners. There are prepunched holes in the jacket panel to help locate and install these components. Use as many fasteners as required to secure control panel and wire duct to front jacket panel. Prepunched holes are for locating purposes only and may not securely fasten components. Run the wire harnesses inside the plastic wire duct between termination points, see **Figure 102**. Instructions for cutting, locating and mounting the wire duct can be found in the electrical book. The wire harnesses' identification and mounting location information can also be found in the electrical wiring diagram book.

**Figure 102** Wire Duct and Control Box



## Thermostat Installation

If a thermostat is to be used to control the boiler always follow the instructions included with the thermostat. Proper location of the thermostat will ensure efficient trouble-free operation of the boiler. Mount the thermostat to an inside wall at a height approximately five feet above the floor. Avoid placing the thermostat in areas that will not provide an accurate measurement of the room temperature. Locating the thermostat behind a door, in an alcove, close to a source of thermal radiation or in a drafty area will cause poor or sporadic heating.

## BOILER OPERATION

**WARNING: Before proceeding read and fully understand the instructions contained in this manual. Do not attempt to operate this boiler if it has not been installed in accordance with the guidelines set forth in this manual. Failure to comply with this warning can result in extensive property damage, severe personal injury or death!**

### Water Boilers

Fill the boiler and all of the radiation with water to the required system pressure. Completely purge the system of air and adjust the system pressure as needed.

### Steam Boilers

Fill the boiler with water to a level 1" below the normal water level line of 33 1/4". Clean the newly installed sections as outlined below:

**CAUTION: Do NOT use any petroleum based cleaners to clean the boiler or the hydronic seals will be damaged!**

1. Pipe the skimmer tapping on the front of one of the end sections to a floor drain using 1 1/2" pipe.
2. Adjust the boiler water level until water begins to flow out of the skim piping at a slow rate.
3. Fire the boiler and maintain a water temperature of 180°F to 200°F. It may be necessary to cycle the boiler.
4. Adjust the water feed to prevent the build up of pressure within the boiler. Continue the skimming process until the discharge runs clear.
5. Shut the boiler off and allow the boiler to cool to 100°F. Remove the skim piping and plug the tapping. Open the blowdown valve and flush the boiler until the discharge runs clear.
6. Close the blowdown valve and fill the boiler with water to a level 1" below the normal water level line.
7. Check the traps and vents for proper operation.

## GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

### LIGHTING INSTRUCTIONS

A. If this appliance is equipped with a continuous pilot it must be lit by hand. Follow the lighting instructions exactly when lighting the pilot. If this appliance is equipped with an intermittent pilot, the ignition control will automatically light the pilot. Follow the operating instructions and do **not** try to light the pilot or burner by hand.

B. BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

C. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

**CAUTION: To prevent being burned, stand clear of the boiler during ignition and don't touch any hot metal parts.**

#### *Continuous Pilot Systems*

1. STOP! Read the safety information above. If, at any time, the boiler will not operate properly, follow the instructions "TO TURN OFF GAS TO BOILER" and call your service technician or gas supplier.
2. Set the operating control to off or its lowest setting.
3. Turn off all electric power to the boiler.
4. Close the manual main and pilot gas shut-off valves.
5. Wait five (5) minutes\*\* to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above (to the left) on the label. If you don't smell gas, go to the next step.
6. Remove the front grill(s).
7. Connect a manometer having a minimum capacity of 20" WC to the outlet pressure port of the gas valve. Make sure that the gas supply piping has been purged of air and that all gas joints up to the manifold have been thoroughly checked for leaks.
8. Locate the pilot(s).
9. Open the petcock pilot valve.

10. Push and hold down the red button on the pilotstat. Light the pilot with a match and wait approximately one (1) minute before releasing the button. The button should pop back and the pilot(s) remain lit. For two pilot systems repeat this procedure for the other pilot. If a pilot will not stay lit after several tries, adjust pilot reg to higher pressure. Turn reg clockwise to increase and counterclockwise to decrease pressure. If pilot still fails to light, close the manual pilot valve and call your service technician or gas supplier.

11. With the pilot(s) lit, turn on all electric power to the appliance.

12. Open the manual main gas shut-off valve.

13. Set the operating control so there's a call for heat.

14. The burners should light with proper boiler operation.

15. A boiler designed for use with natural gas should have a manifold gas pressure of 3.5" WC on High Fire and 0.8" WC on Low Fire for 2 stage units. On an LP boiler, the manifold pressure should be 10" WC on highfire, 2 stage firing not available on LP models. To adjust the manifold gas pressure see the GAS PRESSURE ADJUST-MENT instructions in the BOILER CHECKING & ADJUSTMENT section.

16. Test the ignition safety shutoff device. Close the manual pilot valve. Within three minutes the pilotstat should close de-energizing the main gas valve(s). Repeat steps 9 through 14. Disconnect the thermocouple from the pilotstat, the main burners should go out. Extinguish the pilot and reconnect the thermocouple. There should be NO gas flow to the main burners with the pilot out! If gas flow is detected, immediately turn the main manual shut-off valve off and have the problem corrected.

#### *Intermittent Pilot Ignition Systems*

1. STOP! Read the safety information above. If, at any time, the boiler will not operate properly, follow the instructions "TO TURN OFF GAS TO BOILER" and call your service technician or gas supplier.
2. Set the operating control to off or its lowest setting.
3. Turn off all electric power to the boiler.
4. Close the manual main and pilot gas shut-off valves.
5. Wait five (5) minutes\*\* to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above (to the left) on the label. If you don't smell gas, go to the next step.



# GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

6. Remove the front grill(s).
7. Connect a manometer having a minimum capacity of 20" WC to the outlet pressure port of the gas valve. Make sure that the gas supply piping has been purged of air and that all gas joints up to the gas valve have been thoroughly checked for leaks.
8. Open the petcock pilot valve.
9. Turn on all electric power to the boiler.
10. Set the operating control to the desired setting.
11. The pilot(s) should automatically light. Do not try to light the pilot(s) by hand!
12. With the pilot(s) lit, open the main gas shut-off valve.
13. The burners should light with proper boiler operation.
14. A boiler designed for use with natural gas should have a manifold gas pressure of approximately 3.5" WC on high fire and 0.8" WC on low fire. For an LP boiler, the manifold pressure should be 10" WC. To adjust the manifold gas pressure see the GAS PRESSURE ADJUSTMENT instructions in the BOILER CHECKING AND ADJUSTMENT section.
15. With the burners in operation, close the manual shutoff valve in the gas supply line. As soon as the main burner flames go out, open the manual shutoff valve. A normal ignition sequence should take place. If the burners fail to light the system will make two more ignition attempts. If the burners have not lit after the last ignition try, the gas valve will close and the system will go into lock out. DO NOT attempt to reset the system until the ignition system has been inspected and the problem resolved.

With the burners in operation, interrupt the power to the control circuit by lowering the operating control. The main burners should go out. Reset the operating control, a normal ignition sequence should follow.

To test the ignition safety shutoff device, close the manual shutoff valve in the gas supply line. Within 6 seconds of main burner flame extinction, the main gas valve solenoid should close with an audible noise.

A sparking noise should be heard while the ignition module tries to light the pilot. After 1 minute the module should lockout and the try for ignition end. Open the manual shutoff valve in the gas supply line and reset the ignition control system. A normal ignition sequence should take place.

## To Turn Off Gas To Boiler

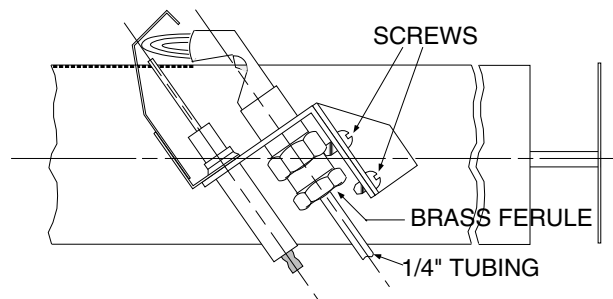
1. Set the operating control to its lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Close the manual main and pilot gas shut-off valves.

## BOILER CHECKING & ADJUSTMENT PILOT ADJUSTMENT

The pilot burner flame should envelope 3/8" to 1/2" of the thermocouple tip or flame-sensing probe, depending on the pilot type. **Figure 103** depicts an intermittent pilot, but the adjustment dimensions for a continuous pilot would be the same. To adjust the pilot the following steps must be taken:

1. Remove the cap next to the pilot tube fitting on the gas valve or on the separate pilot gas regulator where one is used.
2. Turn the pilot adjustment screw on the valve counterclockwise to increase the flame, clockwise to decrease it. On the separate pilot gas regulator turn the regulator screw clockwise to increase the flame, counterclockwise to decrease it.
3. Replace the pilot adjustment screw cap.

**Figure 103 Pilot Flame Adjustment**



## Gas Pressure Adjustment

**NATURAL GAS:** Optimum results are obtained when the boiler is operated at its full input rating, with **3.3" WC to 3.7" WC and 1.0" to 0.8" on low fire of manifold pressure**. The manifold pressure should not vary outside this range. The gas valve pressure regulator has been preset at the factory. If adjustment is necessary the following steps must be followed:

**NOTE: The Honeywell VR8404 valve is factory set and cannot be field adjusted**

## GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

1. Attach a 20" manometer to the tap on the manifold.
2. Remove the regulator adjustment screw cap from the gas regulator. On systems that do not use a separate gas regulator, remove the adjustment screw cap from the gas valve body on the valve closest to the gas supply piping.
3. Rotate the regulator adjustment screw clockwise to increase the manifold pressure, counterclockwise to decrease it.
4. Replace the regulator adjustment screw cap and pressure tap plug.

**CAUTION: Never force the regulator adjustment screw beyond the stop limits or damage to the regulator will occur!**

**PROPANE GAS: A manifold pressure of 10" WC** must be maintained for proper operation of the boiler. If the manifold pressure is off by more than 5% adjust it according to steps 1 through 4 above.

### ***Input Rate***

Gas appliances are rated based on sea level operation with no adjustment required at elevations up to 2000 feet. At elevations above 2000 feet, input ratings should be reduced by 4% for each 1000 feet above sea level.

Check the input rate as follows:

1. Turn off all other gas appliances that use the same gas meter as the boiler.
2. Call your gas supplier and ask for the heating value of the gas.
3. Start the boiler and let it run for 15 minutes.
4. Using the gas meter and a stop watch, clock the time that it takes to burn 10 cubic foot of gas and divide this time by 10.
5. Insert the heating value and the time, in seconds, into the formula below.  

$$\text{Input} = (\text{heating value, Btu/hr})(3600)/(\text{time, seconds})$$

If the computed rate deviates by more than 5% from the rated input value of the unit adjust the manifold pressure accordingly.

**NOTE: The Honeywell VR8404 valve is factory set and can-not be field adjusted**

DO NOT adjust the manifold pressure by more than 5%. If a proper rate cannot be maintained without adjusting the manifold pressure beyond the 5% limit, the main burner orifices must be replaced. If the input rate is too low, go to the next larger size main burner orifices. If the input rate is too high, go to the next smaller size.

**CAUTION: Never increase the input to the boiler above that for which it is rated. Doing so can cause premature failure of the boiler!**

### ***Low Water Cutoff***

Ensure that the low water cutoff device(s) function properly. Test in accordance with the manufacturer's instructions included with the device(s).

### ***Thermostat Adjustment***

For a thermostat that employs an adjustable heat anticipator, adjust the anticipator to match the current measured in the thermostat circuit. An increased anticipator setting may be necessary if the unit cycles frequently. If the room temperature over-shoots the thermostat setting, reduce the anticipator setting.

## BOILER MAINTENANCE

**CAUTION: Servicing, inspection and adjustment must be done by a trained technician in accordance with all applicable local and national codes. Improper servicing or adjustment can damage the boiler!**

The boiler should be cleaned and inspected once a year, before each heating season. Make sure that the burners and ignition components are free from dust, soot, dirt, corrosion or other deposits that would impair the boiler's performance.

### ***Burner Removal***

1. Close the manual shutoff valves in the gas supply lines and turn off electrical power to the boiler.
2. Remove the front grill(s).
3. Lift the rear of the burner up and slide it towards the back of the boiler. When the orifice bracket is clear of the orifice lower the burner and remove it by sliding it forward and out from the boiler.
4. Inspect each burner for damage or signs of deterioration. Use a brush or compressed air to remove any debris from the burner ports.

# GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

## Burner Installation

1. DO NOT install damaged or badly corroded burners, replace them.
2. Install the burners by sliding the rear of the burner tube into the slot located in the base rear panel. Slide the burner into the slot far enough so that the burner bracket clears the orifice on the manifold. Pull the burner back onto the orifice making sure that the notch in the crimped portion of the burners engages the rear burner base panel locking it into place.
3. Replace the front grill(s).

## Heat Exchanger Cleaning

The burners should be removed to protect them from falling rust and scale. Follow the BURNER REMOVAL instructions in this manual.

1. Remove the front grill(s) and front access panel(s).
2. Remove the clean out covers and insulation, **Figure 55 & 56**.
3. Clean each flue passage with a wire brush.
4. Vacuum out the burner base and clean and inspect all of the components. Replace any damaged or badly corroded parts.
5. Replace the insulation and clean out covers,
6. Replace the front access panel.
7. Install the burners following the BURNER INSTALLATION procedure outlined in this section.
8. Replace the front grill(s).

## Vent System

Thoroughly inspect the vent system for any signs of blockage, corrosion or leakage. Immediately replace any unsound vent system piping.

## Controls

Use the BOILER OPERATION and BOILER CHECKING AND ADJUSTMENT sections of this manual for reference.

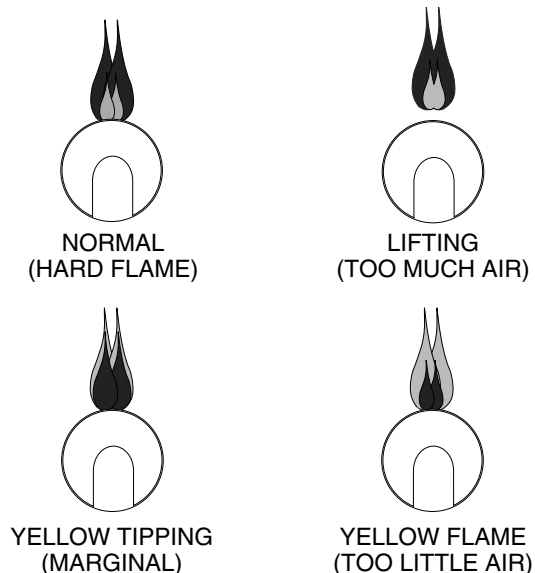
1. Check the thermostat or operating controls for proper operation.
2. A float type low water cutoff device must be flushed out.

3. The relief valve should vent water when the test lever is lifted. It should not weep or discharge water at normal system pressure. NEVER try to clean or repair the relief valve! If the valve fails to operate properly, replace it!
4. The aquastat high limit controls the maximum water temperature in the boiler. It is adjustable from 140°F (60°C) to 240°F (116°C). If the water temperature reaches the set temperature before the demand for heat has been met, the aquastat high limit should shut the boiler off. The water temperature should never exceed the maximum set point of 240°F (60°C). The aquastat high limit cannot be repaired. If it fails to function properly replace it.
5. Visually check the pilot and main burner flames to ensure proper operation, see **Figure 103 & 104**.

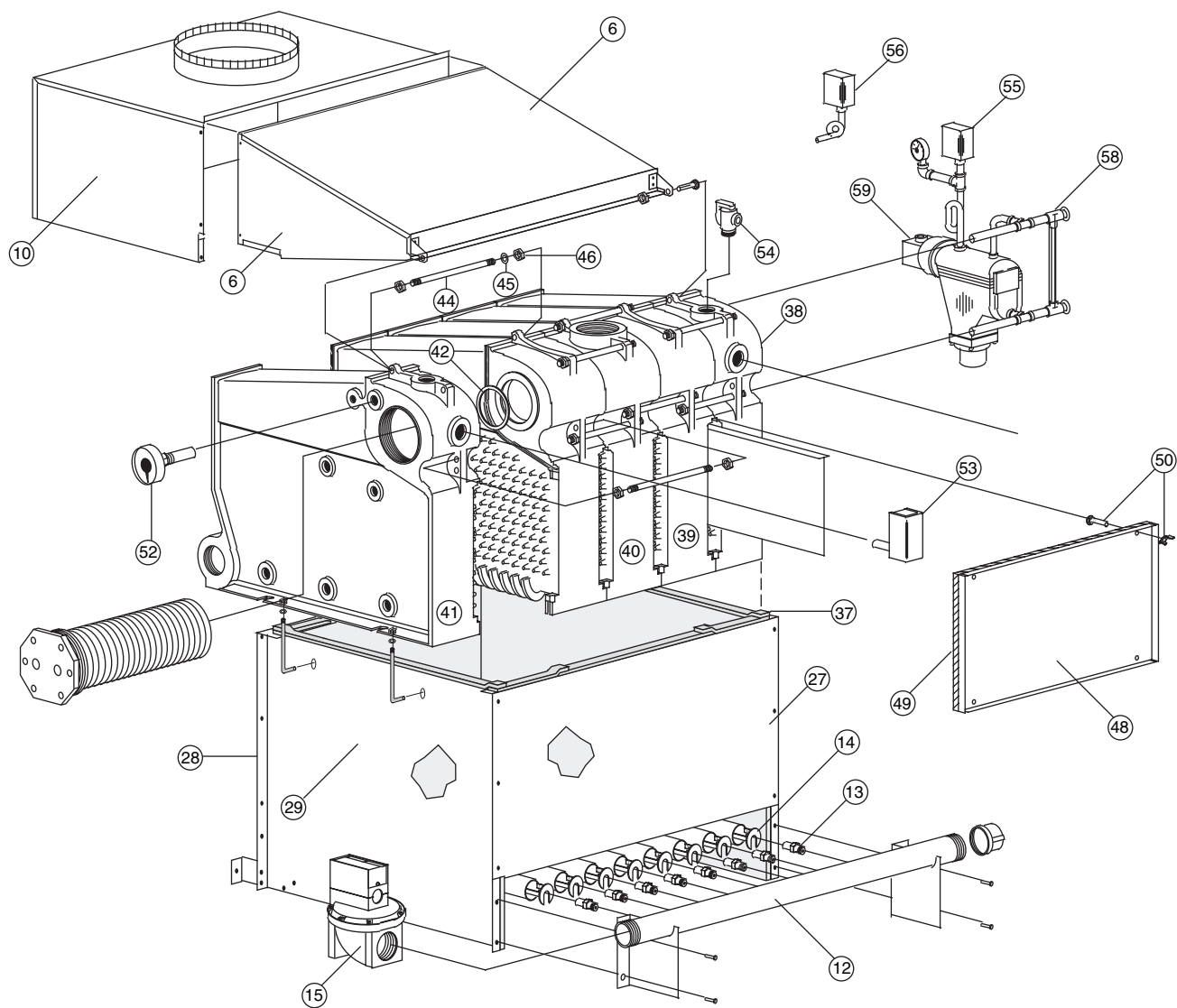
**WARNING: Yellow, floating flames indicate a lack of combustion air. Do not operate the boiler until the problem is solved or severe personal injury or death may occur!**

Figure 104

Main Burner Flames



GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS





# GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

[illegible]

[illegible]

# GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

			Number of Sections with Item Quantities Below																	
Ref #	Name of Part	Part #	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
—	Manual Main Shut Off Valve, 1"	62023	1	1	1	1	1	1												
	Manual Main Shut Off Valve, 1-1/4"	62024							1	1	1	1	1	1	1	1	1	1		
	Manual Main Shut Off Valve, 1-1/2"	62025																	1	
—	Manual Pilot Shut Off Valve,	62028	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	
—	Pilot Regulator RV12LT	50961	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
—	Pilot Ass'y PSE-NA29, Natural Gas	72743	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	
—	Pilot Ass'y PSE-NA29, LP Gas	72739	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	
Intermittent Pilot Ignition Controls																				
—	Pilot, Intermittent, Natural Gas	50978	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	
—	LP Pilot Orifice for the above pilot	50998	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	
—	Intermittent Ignition Module, S8610M	51180	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	
—	Pilot Gas Solenoid Valve V8046C-1014 1/4"	51099	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	
Continuous Pilot Ignition Controls																				
—	Pilot, Continuous, Natural Gas	50972	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	
—	LP Pilot Orifice for the above pilot	50998	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	
—	Pilot Flame Sense Switch	51188	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	
—	Automatic Pilot Switch	50970	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	
27 + 28	Burner Base Less Sides	63265	1																	
		63266		1							1									
		63267			1						1	2	1							
		63268				1							1	2	1					
		63269					1								1	2	1			
		63270						1									1	2	1	
		63271							1										1	
		63272									1									
29	Burner Base Side Panels	63273	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
—	Burner Base Splice Plates	72694									1	1	1	1	1	1	1	1	1	
—	Burner Base Bolts	60246	12	12	12	12	12	12	12	12	32	32	32	32	32	32	32	32	32	
	Burner Base Nuts	60245	16	16	16	16	16	16	16	16	40	40	40	40	40	40	40	40	40	
37	Base to Section Insulation, (25 foot roll)	60201	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	
38	Cast Iron Section, Right Side	3650	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
39	Cast Iron Section, Intermediate w/o tapping	3666																		
40	Cast Iron Section, Intermediate w/ 3" tapping, (steam boilers)	3649	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3	3	

# GB300 BOILER INSTALLATION AND OPERATION INSTRUCTIONS

			Number of Sections with Item Quantities Below																	
Ref #	Name of Part	Part #	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
41	Cast Iron Section, Left Side	3651	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
42	Gasket, Upper Port	60248	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
	Gasket, Lower Port	60249	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
—	3/8" Rope, 42" length	71601	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
44	Draw Rod 1/2" x 7-1/2"	60358	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	
45	1/2 Flat Washer	62098	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	
46	1/2 Hex Nut	60875	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	
48	Cleanout Cover	69696	1				2	1						2	4	3	2	1		
		69697		1				1	2	1						1	2	3	4	
		69698			1					1	2	1								
		69699				1						1	2	1						
49	Cleanout Cover Insulation	65135	1				2	1						2	4	3	2	1		
		65136		1				1	2	1						1	2	3	4	
		65137			1					1	2	1								
		65138				1						1	2	1						
50	Cleanout Cover Hardware Set	72695	1	1			2	2	2	1				2	4	4	4	4	2	
	Cleanout Cover Hardware Set	72696			1	1				1	2	2	2	1					2	
Water Controls & Trim																				
52	Temperature Pressure Gauge	60265	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
53	Aquastat L4006A	50511	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	Well 3/4" x 3"	50502																		
	Aquastat, (manual reset) L4006E	50507	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
54	3/4" x 1" Relief Valve 40#, (water)	61997	1	1	1	1	1	1	1	1	1	1								
	1" x 1-1/4" Relief Valve 40#, (water)	61998											1	1	1	1	1	1		
	1-1/4" x 1 1/2" Relief Valve 40#, (water)	61999																	1	
Steam Controls & Trim																				
54	1" x 1" Relief Valve 15#, (steam)	61982	1	1	1	1	1													
	1-1/4" x 1-1/2" Relief Valve 15#, (steam)	61983						1	1	1	1	1	1	1						
	1-1/2" x 2" Relief Valve 15#, (steam)	61984													1	1	1	1	1	
55	Steam Presssuretrol PA404A-1009	50493	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
56	L4079B-1033 Steam Presssuretrol, (manual reset)	50495	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
—	Steam Gauge	60268	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
58	Gauge Glass Set	61931	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
59	M&M 67-S-2 Low Water Cut-off	51005	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	



## WARNING

Any appliance that burns natural gas, propane gas, fuel oil, wood or coal is capable of producing carbon monoxide (CO).

Carbon Monoxide (CO) is a gas which is odorless, colorless and tasteless but is very toxic.

If your Smith boiler is not working properly, or is not vented properly, dangerous levels of CO may accumulate. CO is lighter than air and thus may travel throughout the building. **BRIEF EXPOSURE TO HIGH CONCENTRATIONS OF CO, OR PROLONGED EXPOSURE TO LESSER AMOUNTS OF CO MAY RESULT IN CARBON MONOXIDE POISONING.**

**EXPOSURE CAN BE FATAL AND EXPOSURE TO HIGH CONCENTRATIONS MAY RESULT IN THE SUDDEN ONSET OF SYMPTOMS INCLUDING UNCONSCIOUSNESS.**

Symptoms of CO poisoning include the following:

dizziness  
headaches  
nausea

vision problems  
loss of muscle control  
weakness

shortness of breath  
unclear thinking  
unconsciousness

The symptoms of CO poisoning are often confused with those of influenza, and the highest incidence of poisoning occurs at the onset of cold weather or during flu season. A victim may not experience any symptoms, only one symptom, or a few symptoms. Suspect the presence of carbon monoxide if symptoms tend to disappear when you leave your home.

The following signs may indicate the presence of carbon monoxide:

- Hot gases from appliance, venting system, pipes or chimney, escaping into the living space.
- Flames coming out around the appliance.
- Yellow colored flames in the appliance.
- Stale or smelly air.
- The presence of soot or carbon in or around the appliance.
- Very high unexplained humidity inside the building.

If any of the symptoms of CO poisoning occur, or if any of the signs of carbon monoxide are present, **VACATE THE PREMISES IMMEDIATELY AND CONTACT A QUALIFIED HEATING SERVICE COMPANY OR THE GAS COMPANY OR THE FIRE DEPARTMENT.**

To reduce the risk of CO poisoning, have your heating system “tuned up” by a licensed heating contractor or the gas company - preferably before each heating season. Also have the service company check your chimney or vent pipes for blockage.

Your home should also be adequately ventilated, particularly if you have insulated your home.

**ONLY QUALIFIED, LICENSED SERVICE CONTRACTORS  
SHOULD PERFORM WORK ON YOUR SMITH BOILER!**

**WARNING: Install, operate and maintain unit in accordance with manufacture’s instructions to avoid exposure to fuel substances or substances from incomplete combustion which can cause death or serious illness. The State of California has determined that these substances may cause cancer, birth defects, or other reproductive harm. Also, install and service this product to avoid exposure to airborne particles of glasswool fibers and/or ceramic fibers known to the State of California to cause cancer through inhalation. The ceramic combustion chamber in the burner box and its gasket contain crystalline silica. Wear a tightly fitted dust mask when servicing the burner and gently handle the burner and its gasket to prevent inhalation of airborne fibers. Crystalline silica fibers have been identified as carcinogenic, or possibly carcinogenic when inhaled.**



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